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SURGICAL CONDITIONS IN THE GREAT WAR.*

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It is evident that it is impossible in the time allotment given by this society to consider separately and take up in detail the many absorbing interesting surgical practices that have been brought out in the great World's War. Any one caption alone, such as the treatment of compound fractures, could be exhaustively considered, the essential points like traction, wound sterilization, repair, pathology and technic of surgical intervention, easily occupying the allowance which is permitted.

It is then, the intention of the writer to take up briefly the many surgical expressions which are contingent upon the traumata and insults of war, and, indeed, to ignore the medical phenomena which may arise by virtue of a pre-existing or coincident surgical state.

The writer claims no originality or individual research whatever, he has referred freely to all medical works, journals and war contributions, paying particular attention to the French and British articles from which he has abstracted literally and liberally, in "British Medicine in the War 1914-1917", which represents the observations of scientific surgeons who have borne the heat and burden of battle for upwards of four years.

It must be recalled that a larger part of the activities of the Western Front have been carried on in a soil which for hundreds of years has undergone an intensive cultivation; this has given rise to the high prevalence of tetanus which claimed many victims in the earlier stages of the combat. Now, all wounded soldiers receive at the first dressing station—"post de secours"—an initial dose of 1500 units, are so tagged, the date recorded, and on being received into the more remote hospitals are again innoculated on the 8th day; this method has greatly reduced and practically controls the mortality from lockjaw. Only rarely is a fatal case seen which is apt to be associated with some other serious surgical state, which in itself has worked havoc in a body worn by the constant vigil of war, and is irresponsive to the antitoxin.

Your writer had the occasion of operating at a well equipped surgical hospital on the Western Front, about 30 miles north of Paris, for six months in 1916, and of witnessing the wounds of high explosives, and in 1917 the opportunity of visiting more than thirty surgical hospitals on the Eastern Front, which had been organized, equipped and manned by Roumanian and French surgeons for the care of the Roumanian and Russian soldiers.

The anatomy of the human body is the same, regardless of creed or color; the pathology of wounds must follow the same biologic laws; and reparation must be guided with the same skill and minuteness, to assure a happy outcome, regardless of the phylogeny of man.

For many years to come there will be numberless volumes written on the "Surgery of War", "Traumatic Surgery," etc., etc. Carrel and Dakin's pioneer contribution on wound sterilization revolutionized the surgical world some two years ago. In skillful, efficient hands it has proven most valuable and is the last word in scientific reparation. Your writer had the pleasure in 1916 of visiting Dr. Carrel's hospital, Rond Royal, Compiegne, and witnessed with much interest and benefit the exact means by which the Dakin Solution was used. The location of this hospital so near the front was favorable, in that the patients were received in from one to six hours after their injury. This early reception obtained in but few of the many hospitals. On admission *x*-ray examinations are carefully made and, with the plate as a guide, foreign bodies are located, their size noted, and operation undertaken. The incision, or incisions, are generous and of sufficient size to give full access to all foreign material, cloth, shreds, fragmented bone, or to an injured viscus. It would be well to note the clothing of the soldier for holes and loss of cloth which may be later located in the wound. The wound is gently, but thoroughly, cleansed of devitalized tissue and foreign bodies; comminuted bone particles devoid of periosteal attachments are taken away, but no fragmented piece of bone is removed that possesses a periosteal bridge; small pockets and

*To have been read at the meeting of the Medical Society of Virginia in Richmond, October 23d, which meeting was postponed on account of the epidemic of influenza.

pendent cavities must be given free drainage, and counter openings made if necessary; hemostasis should be perfected; gentleness, thoroughness, and complete wound eversion should be adopted in every case. The establishment of continuity of a severed nerve may be attempted at this time, usually, however, this operation is deferred to a later date. There is no attempt to remove minute particles of shell or stone which the *x*-ray may show to be dotting the plate. The crushed bone is placed in proper alignment, an appropriate splint applied, and the Carrel solution is now directed to every square centimeter of the wound surface by means of tubes, which are perforated with many holes, tied at the end, and enveloped in Turkish toweling. I have seen as many as 25 tubes used in one case. It is not the intention to use the solution as a means of irrigation, but by simple contact. The tubes also act in a measure for drainage tubes. There is no attempt to close the wound. Gauze wet with the Dakin's solution is applied to the raw surface only, the skin surface being protected by yellow vaseline, because it has been noticed that this preparation may produce considerable irritation to the skin. Carrel's solution is simply hypochlorite of soda and must not be stronger than 45/100 to 50/100 of 1 per cent. Probably the nascent chlorine, or the production and liberation of chloramines is the property which exercises the beneficial effect. There is no super-saturation there is no overflow of the fluid from the wound, the linen and the bed is never soiled. If there is any excess it is attracted into the dressings.

Frequent microscopic examinations are made to note the progress of the wound. Smears are made by means of a platinum needle, are fixed in the flame, stained and examined. When one germ is found to four fields under magnification of an oil immersion lens the wound is considered to be ready to be sewed up. This usually obtains in from four to six days. In bad compound, comminuted fractures, with much loss of tissue, it may take from ten to twelve days. The wounds are dressed every day, new tubes and gauze applied. The flow of the solution must be stopped four hours before the microscopic investigation, as its antiseptic properties may misrepresent the result. The character of the germ found upon investigation carries no individual significance whether it is staphylococcus, streptococcus, gas bacillus, or any other germ. It is the number and not the variety to which importance is attached. One feature in particular illustrated the precise and exact extent to which the knowledge of wound healing had been carried. An instrument placed about the wound measured off accurately the square centimeters of devastation and by a mathematical formula it could then be definitely and positively predicted when the wound would heal. In the few failures recorded, a foreign body, or a piece of cloth, which had escaped the *x*-ray, would be found, this removed, new calculations made and the repair would be completed on schedule time. The depth of the wound, bone involvement and tissue loss has no bearing on the reckoning. In but few hospitals was the ultra-scientific method carried out properly, the result being that the solution was given up and the old standard textbook, boric, bichloride, Theirsch, Ménière's solution, Dichloramine-T, Rutherford Morrison's B.I.-P. (bismuth, iodoform, liquid petrolatum), gentian violet, magnesium sulphate, iodine, Sir Almroth Wright's methylene blue, hypertonic salt solution, Eusol, peroxide, flavine and numberless others would be inaugurated, each hospital claiming the superiorty of one, but none, probably, being in great popularity over a few weeks or months.

It has been given out recently by some surgeons returning from the zone that a new method of wound sterilization is being adopted, based on the wide, aseptic and clean enucleation of all the tissues involved by a surgical operation. I do not understand how this would be applicable to the devastating wounds of the shoulder or knee in which there has been a considerable involvement of the bony structures.

It should be recalled that the character of the uniform has a decided bearing on the wound response; formerly the gray-blue clothes of the French were of a very inferior quality, large fragments would be carried ahead into the tissues by the missile and unrecognized by the *x*-ray, be a source of infection and suppuration until removed. I believe that in the Russo-Japanese War the warriors from Nippon were enjoined to bathe freely and change the underclothes before entering into battle; statistics bear out the wisdom of this cleanliness.

With the advent of young America into the war there was a spontaneous rejuvenation of the war-wearied Allied Forces, and through the ranks of the front line trenches rang the slogan "America is here". The best of the medical talent available in the United States had volunteered, men of international reputation; supplies, paraphernalia and armamentaria for the surgical and medical care of every known injury and disease were soon to be found in all the hospitals; organization is daily being perfected; but with an army advancing or re-

treating the necessary supplies and assistance must of necessity be at times delayed or not forthcoming.

ANESTHETICS.

Captain Geoffrey Marshall, R.A.M.C.S.R., states that the division is best accomplished by three classes:

I. *The lightly wounded.* These are good subjects for the gas oxygen, which is preferred in such instances, but when not available ether is used. Local anesthesia being used in only a small number of cases.

II. *The seriously wounded,* attended with shock. Spinal anesthesia has been urged for all injuries of the legs and thighs. In practice it has been noticed that when this preparation is used in open wounds it is attended with further shock, pallor, vomiting, occasionally convulsions and death. Dr. Jonnesco, of Bucharest, has used spinal anesthesia in 8,000 cases with no fatality. I had the opportunity of witnessing him operate at the St. Spiridon Hospital at Jassy, Roumania, a considerable number of times last summer, in which he used the intra-thecal method from as high as the second cervical vertebra down. Tumors of the thyroid, foreign bodies of the scalp, radical mastoids and other cranial and cervical operations were carried out by this intra-spinal anesthesia. No other anesthetic was used on the Eastern Front but this spinal injection, it being employed in every hospital, under every condition, with apparently uniformly good results. It must be noted that the specific gravity of the fluid as prepared by Jonnesco is different from that of Babcock in this country, the patient not having to be inverted to prevent its ascendency from the point of insertion. In a series of many hundred cases witnessed in visiting some thirty odd hospitals I never saw a general anesthetic administered. This may have been because the Roumanians were unable to secure either chloroform or ether. All cases in profound shock should be supplied hot water bottles or hot air bath before being operated upon. Morphine is given generously, and preferably gas-oxygen administered by an expert gently and soothingly.

III. *Those suffering from a serious degree of sepsis, especially the anaërobic infection.* It has been well demonstrated that one suffering from sepsis will stand a capital operation such as amputation much better than one who is suffering from shock. It is recommended in these cases that gas-oxygen be the choice. Spinal anesthesia, warm ether vapor, and intravenous ether are also recognized as being comparatively safe. Chloroform should at all times be avoided.

SHOCK.

The writer will attempt no definition or pathology of this condition. Shortly after my visit to Dr. Carrel, in August 1916, his hospital at Compiegne was to be closed since he considered at that time that the theory and practice of wound sterilization had been so perfected that he could confidently hand his developments over to the medical profession, and he was then to go to the front, where he could come into immediate contact with those suffering from wounds and shock. We have never heard the result of his investigations. To all surgeons, the dusky pallor, with flickering, wavering pulse, lowered surface temperature, dilated pupils, sweat and repeated vomiting, consciousness until within a few minutes of death, is a well recognized train which portends a profound state known as shock. A systolic pressure lower than 80 mm. by the Riva-Rocci sphygmomanometer indicates a questionable outcome. The treatment of the condition must be immediate, the application of external heat by electric lights, improvised hot air bath, hot water bottles, blankets and stimulants. An arterial blood pressure which continues to rise for several hours is favorably recognized. Fluids are best given either by mouth or rectum. The Murphy continuous drip, with morphine, and the elevation of the foot of the bed are the well-known hospital combatants for this unknown surgical state. Intravenous administration of fluids is not so happy in its outcome on account of the lowered arterial and venous flow. Transfusion of blood is probably the best of all methods, but fresh blood is at a premium among shrapnelled soldiers. At present there is an investigation of the use of artificial viscous fluids being carried on without any marked benefit being noted.

Deaver in Annals of Surgery, Vol. LXIII, calls attention to the difficulty of differentiation between shock and hemorrhage. He says "the leucocyte count which is increased in hemorrhage is not apt to be affected by shock," but much depends on the intuition of the experienced surgeon who, more often than not makes the differentiation correctly.

BURNS.

Burns from explosives, sapping and gasoline are treated as in civil practice. A product brought out by the French, "Ambrine", is a gentle protectant, with paraffine as its base, which is melted and then sprayed by an atomizer over the surface after the wound has been surgically cleansed and the field prepared.

TRENCH FOOT.

Trench foot is really a minor degree of frost-bite. Lorraine Smith has shown that the primary

lesion is vascular, with a secondary inflammatory reaction, the only difference between this condition and true frost-bite is one of degree, the severe forms ending in gangrene. Professor Delphine emphasizes the importance of a layer of air about the lower extremity in preventing trench foot and has devised a light oil silk bag that can be worn by those in the continuous slush and mud of the trenches.

GAS GANGRENE.

There are two types: 1. "gaseous cellulitis" and 2. "massive gas gangrene". The former term was used in the milder cases in which the cellular tissue about the wound was considered to be the primary seat of the disease, the latter term to those cases in which the whole limb was rapidly involved, the patient dying. The former type was treated by multiple incisions and drainage and the latter by amputation. From a clinical point of view it was found that the conditions that favored the onset of the disease were: (a) The retention of extravasated blood and wound secretions, (b) interference with the circulation, (c) the presence of large masses of partially devitalized or dead tissue, (d) extensive comminution of long bones, (e) the presence of particles of clothing in the depth of the wound. It was noted that dressing which dried and caked, predisposed to the infection so that the dry wool and gauze of the English surgeons was abandoned for a light moist dressing that encouraged the discharge of blood and serum. Likewise interference with the circulation predisposed to infection of the gas bacillus. The tourniquet could not be dispensed with in every instance; in those cases when it was necessary the patient was taken with all haste to an advanced station that the hemorrhage might be stopped. Circular bandages also retard circulation, particularly when applied over comprehensive gauze dressings. In compound fracture fixation of the limb must be carried out; Thomas or Lister splints answer these demands.

Thrombosis, or rupture of an artery involves a most delicate surgical procedure which cannot be undertaken without every perquisite. Tuffier's tube to restore the circulation and Bernheim's canula have been tried with varying success.

The devitalized tissue that produced a nidus for the development of the gas producing organism must be gotten rid of by excision through the opened wound. This has greatly improved the end results.

The bacteriology is interesting, for it has been established that the number of gas producing organisms steadily decreased with the lapse of time, while the pus producing organisms increased. This bacteriological fact substantiates the clinical observations that the likelihood of gangrene occurring became steadily less as the wound got older and suppuration more established.

I had the pleasure of meeting Dr, Kenneth Taylor, a member of an American ambulance at Ris Orangis near Paris, which hospital was under the personal supervision of Dr. Jos. A. Blake. Dr. Taylor states that he believes that the trouble is essentially a disease of the muscles. Some clinical observers working in the British army have supported this view. It was found that gas gangrene seldom produced serious symptoms unless the muscle was infected, and that the muscles might be killed and gaseous while the intermuscular planes remained little altered. It was also pointed out that single muscles and muscle groups were very apt to be picked out while others remained healthy. It was noticed that invaded muscles were nearly always muscles that had been wounded. The disease would spread up and down these, but showed little disposition to pass to this uninjured fellows. Advantage was taken of these facts to excise those muscles affected, and thus arrest the disease without recourse to amputation.

It was further recognized that crepitations and color changes in the skin might be comparatively late manifestations of the disease, and that death of the muscles might take place before these signs were evident. It became apparent that the discoloration of the skin was due to arrest of the blood supply, brought about by the death of the underlying muscles, and that crepitation was largely due to a forcing out of the gas generated in the muscles into the intermuscular planes and subcutaneous tissue, and that the crepitation in the muscle was really a very late stage in the process of disintegration.

If it is accepted that this disease is mainly one of muscle, some measure of explanation is afforded. The question still remains, why do some muscle wounds lead to gas gangrene and others not?

Most observers believed that the organisms could only live in dead muscle. In every wound there is dead muscle; but if the diseased condition should spread, the organism, on the assumption that the bacillus could only live in dead muscle, must be able to kill the muscle.

D'Este Emery, who had been impressed with the repeated return of the disease in amputation stumps and its rapid spread, in a most suggestive paper showed that the poison produced by the B. aërogenes capsulatus had a powerful negative chemotaxic influence on the leucocytes. These experiments performed in vitro were in strict consonance with the

histological observation that there is no leucocytosis when gas gangrene is active, and that the leucocytes only appear when the disease is in the process of arrest.

McNee and Dunn have offered the following explanation:

The bacteria which are responsible for the causation of gas gangrene lead their normal existence as saprophytes in decaying organic material. When these organisms obtain access to the tissues which have already been devitalized by loss of blood, they find an environment entirely suited to their growth, and proliferating readily, they produce gas and liquefaction of the tissues. This process is simply the uncontested invasion of dead material by bacteria, and it is entirely similar to what may occur in the whole body after death. The organisms most frequently are unable to establish themselves in the healthy, undamaged tissues, and are soon destroyed by phagocytic action. The progressive death of the muscle permits further luxuriant growth of the organisms and extension of their lethal effects. The sugar content of the muscle is favorable to the growth of the anaërobics, and the result is the production of a highly toxic fluid.

When gangrene appears in the muscles, or muscle groups actually wounded, the treatment depends on the condition of the patient. If this is good, the wounds are freely opened and the affected muscles or muscle groups removed. The test employed to distinguish dead from healthy muscle is the want of contractility or the presence of the brick-red color.

Even with the gangrene localized to certain muscles, amputation is the safest course, if the condition is bad, and it is seldom possible to save such a limb if the bone is broken.

WOUNDS OF THE HEART.

There has been one successful suture of a heart wound. It was performed by Capt. John Fraser. The details are as follows: A bomb fragment entered immediately internal to the left nipple. There was a persistent and pulsing escape of rather dark blood. A probe passed upwards and towards the mid line evidenced a cardiac rhythm. The pulse was small and irregular; the patient distressed and cyanosed. A portion of the fifth rib and its cartilage was removed, and the fourth costal cartilage detached from the sternum. The pleura and fat were retracted, and the pericardium incised. The latter contained a quantity of dark blood. A small hole the size of a pea was found in the right auricle. By a suture the auricle was pulled up into the wound and the hole closed by two linen sutures. The progress was good and the pulse, which had been 120 dropped to 90 on the fourth day.

The patient nine months later reports his health excellent.

WOUNDS OF THE BLOOD VESSELS.

It may, in the first place, be noted that the conception of many surgeons of the size of the lumen and of the thickness of the wall of the arteries in general has undergone a change in this war, and it has often been remarked by medical officers that the arteries are smaller and have slighter walls than was expected.

Lateral sutures of both veins and arteries has been done in a fair number of cases, and in two instances a lateral rent in the vena cava itself has been closed, although the only successful case was one in which the sides were brought together by artery forceps and not by suture. The opportunity of end-to-end suture of arteries has rarely offered itself at the front, and as far as the writers know has only been even temporarily successful in one case, that of a bullet wound of the brachial artery; and this vessel gave way and formed an aneurysm some three weeks later. In a few cases the femoral artery has been sutured, but in no case has the operation saved both the limb and the patient.

Even in the popliteal space, where some approximation of the arterial ends can be obtained by flexion of the knee, no case has yet occurred in which arteriorhaphy has seemed feasible while small wounds of the limbs or neck with an arterial hematoma seem hardly suitable for this method of treatment.

It is under these circumstances that "Tuffier's tubes" offered some hope of saving the limbs from gangrene when arterial suture was out of the question. They have been employed at the front on many occasions, and are, it is believed, well worth trying; although they become blocked within twenty-four hours, they have appeared to tide a limb over this most critical period before the establishment of the collateral circulation. In one case it was noticed that the tube itself remained unblocked although the artery below became obstructed by a clot, and it may be that this distal clotting in the artery will always be a difficulty in practical as opposed to experimental surgery. It must be remembered that in actual practice the limb below the lesion has been deprived of blood for some time before the opportunity occurs of inserting a tube and re-establishing the circulation, and it may be that this period of starvation produces changes in the vessel walls that favor clotting.

In civil practice, after the interruption of the main blood supply of a limb and the consequent occurrence of gangrene in its lower part, one looks for and sees the formation of a definite line of demarcation. But in the present campaign it has been found that, after the destruction and ligation of an artery, this line of demarcation fails to appear in the majority of cases, and the seat of the amputation has to be chosen by noting the place where the limb becomes cold and discolored, or where the capillary circulation is still active as shown by the return of the skin blush after pressure.

It is a fact at once curious and important that the arrest of the blood current at a point that is considered a favorable one for the application of a ligature in civil practice is often followed by gangrene when the arrest is caused by a gunshot wound. Wounds of certain arteries stand out as especially dangerous to the vitality of the limb, notably those of the popliteal and the anterior and posterior tibial vessels.

INJURIES OF JOINTS.

In the early days two lines of treatment were followed. The small perforating wounds were left alone and allowed to heal, the progress of the joint being tested by aspirations if necessary. The larger wounds with escape of synovia or actual laying open of the synovial sac were drained, and at first the drains were often introduced into the joint cavity. The results of this treatment were undeniably bad, and all sorts of heroic measures were adopted for the arrest of the septic process which ensued. But continuous irrigation with an acute flexion of a widely opened articulation gave equally poor results, and the patient was lucky if he escaped with a stiff leg.

The first improvement was the abandonment of the intra-articular drains. The next was the excision of the wound, the removal of any foreign body, the flushing of the joint, and in some cases the closure of the capsule and the insertion of a superficial drain. Closure was especially advocated by Colonel Gray in the year 1915.

The next step was perhaps a bold one. As soon as possible after the receipt of the injury—that is, in the casualty clearing station—the wound was excised, the joint opened, cleaned, and irrigated, and then the whole wound in the synovial sac and the superficial tissues was tightly closed. It was certainly astonishing how seldom infection followed such treatment, even when fragment of shell or pieces of clothing had been removed from the joint; but for its success it is essential that the incision around the wound edges should be carried quite clear of all infected tissue, and that the strictest asepsis is assured.

Guillotining the articular ends of the bones in joint involvement is another method which has fallen in disuse, it offered only an irremediable stiff joint and possibly repeated operations.

Now, every knee-joint with such a wound is given the chance of healing by first intention, although the closure of the joint defect may entail the performance of a plastic operation to provide an adequate cover with a flap of synovial membrane or skin. Even if some infection does follow the closure of the joint, it is well not to be in too great hurry to lay the articulation open, for a certain number of such joints do settle down and provide a better limb than if submitted to more active treatment.

When the joint wound is complicated with fracture of bone it may still be possible in some cases to close it with success. In cases of compound fracture of the patella with loss of substance, partial or complete removal of the fragments and the provision of a skin flap, will often be followed by primary healing.

When the tibia or femur are involved the case becomes more serious, of the two fractures that of the tibia is the more to be feared.

In cases of only partial loss of the articular surface of either the tibia or femur, and also in the linear oblique fractures of both bones running up into the joint it is often worth while to try to close the joint and to obtain primary union.

When there is much comminution of bone, however, and a dirty wound, it is better to abandon all hope of saving the joint and perform a limited primary excision. After such an operation the joint surfaces are usually kept apart by extension on a suitable splint, and Carrel's treatment adopted until the wound cleans, when the bone surfaces may be allowed to come into contact.

The knee is the only joint in the body in which penetration of the synovial sac is at all commonly seen without damage to the bony constituents of the articulation. It is therefore not common to have the opportunity of closing other joints, but the opportunity should be taken when it is offered.

More often the surgeon has to treat a greatly disorganized articulation, and in such cases a primary excision is most probably the best course, especially in the cases of the shoulder and the elbow.

1. Fixation of a suitable splint. In the case of the knee this splint should be one of the varieties of the "Thomas" as used for fractured thigh.

2. Beyond this treatment nothing more is required in simple perforating wounds.

3. The taking of an *x*-ray picture in cases where there is a possibility of the retention of a missile or of fracture of the bones.

4. The excising and cleansing of the damaged tissue and the exploration and lavage of the joint.

5. The closure, if possible, of the joint cavity.

HEAD INJURIES.

Advantage was taken of the fact that a head case before operation travelled well, and the special hospitals were placed in the back part of an army area. These hospitals were never subjected to the sudden pressure that may fall on an advanced casualty station, and consequently the cases could remain there for a long time. By this means patients experienced the advantages both of early operation and prolonged rest. The actual method of evacuation is as follows: The patients are brought from the trenches to the casualty clearing station as rapidly as possible. Here they are examined and dressed. If the pulse is rapid they are put to bed and evacuated later, should they improve. No special attention is paid to the type of wound—reliance is placed on the slow pulse as a sign that the patient will bear the injury.

It has been found that the removal of bone sufficient to expose half an inch square of injured dura is best suited to most cases. Opinions still differ, perhaps, as to the comparative merits of making a flap or enlarging the scalp wound. On the whole the flap is the best as a routine, unless the wound, as in the case of a horizontal one, is so situated as to compel the use of a very large one.

The recognition of the fact that a slow pulse is not necessarily a symptom of compression (for it may occur with a wide exposure of the brain), and that the symptoms, paralytic and otherwise, are not due to the depression of fragment but to a destruction, or commotion of the brain matter which is not remediable by operation, has also had an effect opon operative procedure. In the first place a slow pulse is welcomed as a sign that recovery may follow, and it is not taken as a sign that operation is urgently needed, but rather that it is worth doing. The recognition that depression of fragments is not the usual cause of the symptoms has also done away with the notion that their removal must be immediately undertaken.

Colonel Sargent has pointed out that for at least twenty-four hours after injury the brain is liable to be edematous, and to extrude unduly if operated on while in this condition. A moderate delay has also been said to be helpful in that it allows adhesions to form between the dura and the pia mater, thus lessening the chance of a spread of infection over the brain surface.

An *x*-ray had become a necessity, and the opinion was gradually formed that a limited and intelligent search for bony fragments and other foreign bodies was beneficial, but that attempts to reach a missile which was deeply embedded in the brain were not justifiable. Results seemingly have proved the correctness of this line of treatment, for fragments of shell are reported to have caused little trouble, provided their weight was not enough to cause pressure on the surrounding brain during movements of the patient.

A drain introduced under the scalp is still generally employed.

Most surgeons have accepted the recommendations of Sargent and Gordon Holmes that depressed fractures over the longitudinal sinuses should be left alone in the first instance.

Most operators are of the opinion that the dura mater should not be opened if found intact. The recognition that true compression of the brain is seldom seen has helped the formation of this opinion.

A brief recapitulation of the treatment would be: A primary cleansing of the wound. The transmission of the patient as soon as possible to the hospital where he will convalesce. The taking of *x*-ray pictures. The incision of the scalp and bone wound. A limited and careful removal of foreign bodies. The covering of the exposed brain. The closure of the wound, with superficial drainage, and a prolonged rest in bed.

ABDOMINAL WOUNDS.

Nine abdominal wounds means roughly about 600 wounded men, taking a moderate estimate of the proportion of abdominal wounds to total wounds.

The statistics of the South African campaign are very defective. Surgeon General Stevenson in the official history of the war was only able to collect 207 cases of abdominal wounds. Among them it is stated that there were 26 laparotomies with 18 deaths, a mortality of 69.2 per cent, and according to Stevenson the mortality was really even worse. The total death-rate of all abdominal wounds quoted—operated and unoperated—is given as 30.4 per cent.

It is no longer a question of whether a man could be operated upon, but whether he should be operated upon. The customary procedure was to put the man in the Fowler position, to improve the general condition by rest and warmth, to withhold

food and water for three days and to administer morphine. The thirst, which was a distressing symptom of this treatment, was combated to a certain degree by rectal salines and mouth washes.

In May, 1915, an inquiry into the causes of death after abdominal wounds established the following facts:

1. That the injuries were as a rule of such a nature that recovery must be a very rare event.
2. That hemorrhage was a chief cause of early death.
3. That bullets produced very extensive injuries.

The British practice has been to operate a short distance behind the line.

A certain number of cases of rupture of a hollow viscus without abdominal penetration have occurred, and have made it advisable to explore the intestines in some instances even when the whole thickness of the abdominal wall was not penetrated by the missile, but where the symptoms have pointed to the probability of a lesion of one of the hollow viscera. The practice is now to operate on all cases unless there is some reason to the contrary, and to operate on principle rather than on the indication by symptoms. Celerity is of great importance. The body heat must be preserved in every way. There should be the least possible exposure of the viscera, and the intestines should be kept inside the abdomen as much as is compatible with the necessary manipulation. The least possible should be done. All the intestines should be examined. Suture of the intestine should always be preferred to resection unless the latter is inevitable, or saves time, and experience has shown that a single continuous suture, applied so as to invert the peritoneum, is quite sufficient and perfectly secure. Linen thread or thin silk are both preferable to catgut, and care is required not to draw the stitches too tight. If resection is unavoidable, end to end anastamosis is preferable to lateral apposition as a rule.

Solid organs should be disturbed as little as possible, unless vessels have been opened. Excision of spleen and kidney should be practised with great reserve.

Through-and-through wounds of the liver are best left alone, but if the *x*-rays show a large piece of shell or bomb in an accessible position it should be removed, for if left it generally causes dangerous sepsis in the organ.

Abdominal drainage is most probably of little use except in local lesions.

Artificial ani in the colon are to be avoided if possible.

At the Eastern Front with the Roumanian army all abdominal cases except evisceration were treated expectantly, this may have been due to the insufficient frontal hospitals and adequate means for transportation of the wounded.

THORACIC WOUNDS.

The number of chest wounds admitted to the clearing station is about 2 per cent of the whole number of wounds admitted. The most favorable cases are those in which a bullet has gone right through the chest.

In cases where the missile has involved both the chest and the abdomen the prognosis is very unfavorable. Occasionally the whole stomach, or part of the intestine, is drawn up into the pleura through a wound of the diaphragm. In other cases the abdominal viscera are so injured as to prevent recovery. In any case the addition of a wound of these organs to the temporary loss of the use of one lung, which is the usual result of a wound of the chest, produces a condition from which very few recover. Injury to the spinal cord is a still more fatal complication.

There is often much distress if the external wound admits the free entry and exit of air in respiration. It is almost at once relieved if the wound be made air-tight with strappings over the dressing. After careful paring of the wound, removal of loose bone, and blunting of sharp edges, the skin and, where possible, the muscles are drawn together and stitched over the aperture, leaving either only a small hole for the drainage tube or none.

General Antonin, commanding medical officer of the 2nd Roumanian army, gave me an article representing the consensus of the Roumanian surgical opinion in the treatment of thoracic wounds; it practically substantiates the British records. In one ward in Bacau (Roumania) there were 28 cases of thoracic injury, all were getting well, none had been operated on, although aspiration had been repeatedly carried out in several instances.

FRACTURES.

(a) The cleansing of the wound, (b) the setting or reduction of the fracture, followed by its maintenance in good position.

The organisms that infect a compound fracture may be roughly divided into: (a) anaërobic or gas gangrene producing: (b) pus producing organisms.

The development of the operative side of the casualty clearing station and the provision of *x*-ray have been of inestimable benefit to the patient. There can be no doubt that the chance of the patient recovering with a good limb and of escaping a long period of suppuration depends on the attention that

can be paid to his wound in the first instance. No amount of after-care can ever make up for the want of it at the first moment. A thorough and deliberate operation is all-important. There must be a free opening; the cavity must be explored by the eye, as well as by the finger, otherwise dead tissue and possibly foreign bodies will be passed over.

The early, deliberate and efficient cleansing of the wound is the basis of success, no matter what chemicals are used after the operation has been scientifically carried out.

VOCATIONAL TRAINING AND EDUCATIONAL THERAPHY.

The writer presumes to predict that the Government will adopt measures by which those soldiers who have lost arms, legs or eyesight will be educated along lines designed to develop their remaining powers so that a livelihood may be maintained in jobs which will be held open for those cripples. Men with only *one arm* can be ticket choppers, ushers, carriers, collectors, elevator-attendants, planters; with only *one leg*: clerks, accountants, book-keepers, ticket-sellers, chauffeurs (with the machine properly adjusted) locomotive engineers, pilots, machinists, carpenters, brick layers. The blind require greater attention and educational development. Basket making and carpentering, chair making, the making of tubs, vats, rugs and mats, shoes, sailmaking, wood working, the designing, manufacture and production of toys, dolls, wagons, etc., musicians, piano-tuners, telegraphers, telephone operators represent possible occupations for those with impaired or lost vision.

J. Gourdon, Bulletin de l'Academie de Medecine, states that in observation of 5,014 maimed soldiers with grave and incurable lesions 73% resumed their former occupation with or without prostheses, 27% requiring vocational training. About 30% were crippled in the arms.

He further states "War cripples seem to lack the will power more than others, and they tire more readily." Persons accustomed to till the soil formed 62 per cent of the total, and they return to farm work more readily than others. Fully 85 per cent of the farmers and 48 per cent of the farm hands spontaneously returned to farm work after being supplied with prostheses for the purpose. The loss of an arm does not incapacitate more than 25 per cent, and disarticulation of the shoulder not more than 50 per cent. Amputation at the thigh causes about 50 per cent incapacity. The incapacity from loss of a leg is not over 10 per cent in industrial work.

One thing is certain, this being our country, and our own flesh and blood having been sacrificed for right and honor, it is up to us who have stayed at home to do all we can and more for our maimed heroes returning from the battle line.

Grace Hospital, Richmond, Va.

DEAD TEETH.[1]

JOSEF NOVITZKY, D.D.S.
SAN FRANCISCO, CALIFORNIA.

It is not strange that medical and dental diagnosticians have not reached a very definite understanding as to whether, "after the usual attention by the average dental practitioner, there still remains in and about the teeth infection sufficient to induce a focal area, with eventual serious consequences to the entire body." For medical diagnosticians, in spite of such striking exceptions as William Hunter, M.D., F.R.C.P., have tended to leave everything regarding the teeth in the hands of dentists. And dentists worthy of the name of oral diagnosticians are few and far between. The average dental practitioner has had little knowledge of pathology. What was taught him in dental colleges concerning septic conditions of teeth and jaws was in many cases wrong. On this wrong foundation the average dentist would build up a life-long practice of incorrect treatment. At the present time, however, physicians, and some dentists, especially on the Pacific coast, are not disregarding the teeth as possible sources of dangerous infections; and the main problem of dentists has become that of septic teeth and jaws.

During the past few years I have stated very positively on several occasions that all devitalized teeth are dead teeth and subject to the laws of infection and putrefaction. This has been stated not as my opinion but as the inevitable conclusion drawn from the careful pathological examinations of hundreds of devitalized teeth. Of these hundreds of devitalized teeth, there was not one which, six months after devitalization, did not show unmistakable evidence of infection.

Nevertheless, the results of such careful pathological examinations have not been accepted. There are still leaders of the dental profession who definitely express the opinion that a devitalized tooth may be retained in the jaw and aseptically filled "with no post-operative periapical infection." It is claimed that Roentgen ray examinations and cultural tests will establish this opinion as a fact. But I have failed to find any statement to the effect that any one properly conducting cultural tests, six

[1]Histological work done in the Laboratories of Surgical Pathology of Leland Stanford, Jr., University Medical College.

months after tooth pulp devitalization, did actually establish the lack of infection as a fact.

The presence or absence of septic areas is not a thing to be determined by opinion or arguments upon theory. We have here a clear question capable of being decided by arguments of fact.

The answer to the question whether a devitalized tooth can be retained in a permanently sterile condition in the mouth depends on whether a devitalized tooth is dead. Physicians and dentists are willing to grant that when a tooth is dead, it cannot be retained permanently sterile in the mouth. But they are not yet willing to grant unanimously that a tooth is dead when it is devitalized. Many

Plate 1.
Photo micrograph by Dr. F. E. Blaisdell.

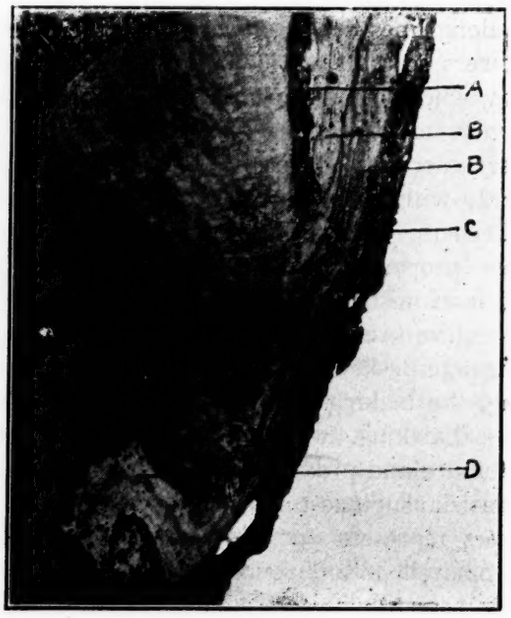

Plate 2.
Photo micrograph by Dr. F. E. Blaisdell.

of them still hold, that after the pulp is removed, a tooth may retain vitality, may receive nourishment, and may be capable of growth.

This attitude is due to the confusion between what is and what is desired, to the conflicting statements of dental histologists cited as authorities, and to the dependence on authorities, theories, and opinions instead of on scientific facts established by observation and experiment.

If then we can prove that a devitalized tooth lacks vitality and is incapable of receiving nourishment, we must conclude that a devitalized tooth is dead and hence cannot be retained without infection. And we may confirm our conclusions by Roentgen ray examinations and cultural tests.

When the dental pulp has been removed and the apical foramen closed, the only possible nourishment to the tooth would be by means of or through the cementum which surrounds the root. On the possibility of such nourishment hangs the whole tale.

Dr. Grieves writes, "While there has been no proven communication through the first cemental lamina which is quite dense, the nearest vital cells, the cementoblasts in the second lamina, suggest from the trend of canaliculi, which is only in the direction of pulp and peridental membrane that some osmosis of tissue juices must exist from pulp to membrane, in fact any other condition is biologically inconceivable." And he quotes from Hopewell-Smith the statement of Tomes (incorrectly cited as "Tome") in support of this view. In the quotation,[2] he omits Tomes' word "pulp" after "tooth" in the 4th line; and he fails to indicate that Hopewell-Smith "entirely disagrees" with the quoted view. Moreover, Dr. Grieves indicates that leading histologists have adopted the view of Tomes. I maintain that not a single one of the leading histologists have adopted Tomes' view. This acknowledgement in the quotation of a lack of proof is strange in the face of such positive assertions as,

"So soon as the dentist's instruments passes through the epithelial protection, sometimes even before, into cell-lymph spaces or by the dento-enamel junction, into the granular layer of Tome, he is in slow but sure absorptive contact with the blood stream."

"Sufficient evidence has now been presented to establish, as the very first consideration, the vitality

[2]Journal National Dental Association—August, 1918. Page 782.

of the apical cementum which must not be destroyed in pulp devitalization."

There is no evidence in support of Dr. Grieves' opinion, which seems to be influenced by the statement of Tomes. And a further reading of Tomes would disclose statements contradicting the quoted view, as, "Vascular canals corresponding to the Haversian canals of bone are met with but it is only in thick cementum that they exist; and, in man, perhaps in exostosis more often than in the thick healthy tissue."[3]

Better authority than Tomes are Hopewell-Smith, Noyes and Black, all of whom present sufficient

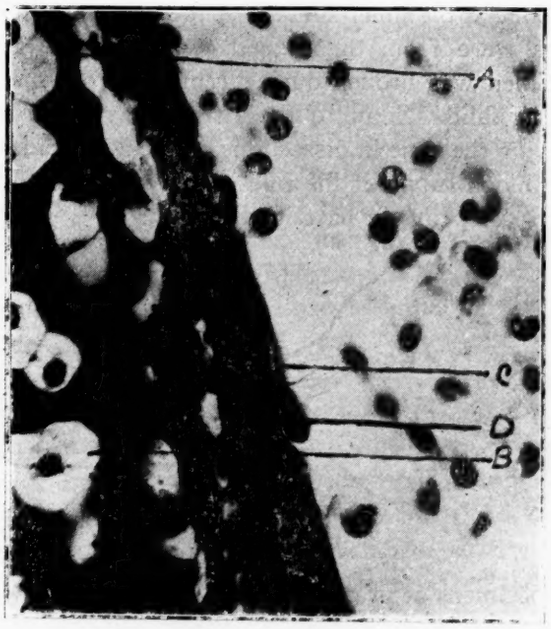

Plate 3.
From the collection of Dr. F. E. Blaisdell.

evidence to prove that the human tooth is not kept vital by the cementum.

If in examination, opossums' teeth had been substituted for human teeth, Dr. Grieves' view could then be given the semblance of truth, but under this condition only.

Right now the main point is that we must not depend on the view of any one of several conflicting authorities. The value of our work will depend on the degree in which we introduce evidence that will warrant definite conclusions.

The theory that a tooth receives nourishment by means of or through the cementum is very attractive; but Noyes, Black, Hopewell-Smith, and others have rejected this theory by their repeated statements that normal cementum is structureless. The lack of structure in normal cementum has been corroborated by my own laboratory investigations in surgical pathology.

[3]Tomes, Dental Anatomy, Page 103.

My own investigations with specimens secured by grinding, decalcified paraffin sections for oil immersion, and decalcified celloidin sections show clearly that cementum in normal thin layers from the teeth of man is structureless. There is no way for blood vessels or blood to pass from joint to pulp or vice versa except by way of the apical foramen. According to Dr. Southwell of Milwaukee, when fluids were sealed in the pulp chamber of an extracted tooth and the tooth then placed in another liquid, there was no trace of fluid diffusion unless the cementum had been removed; attempts to force compressed air through the lateral root walls also failed.[4]

Excess of cementum due to septic or other irrita-

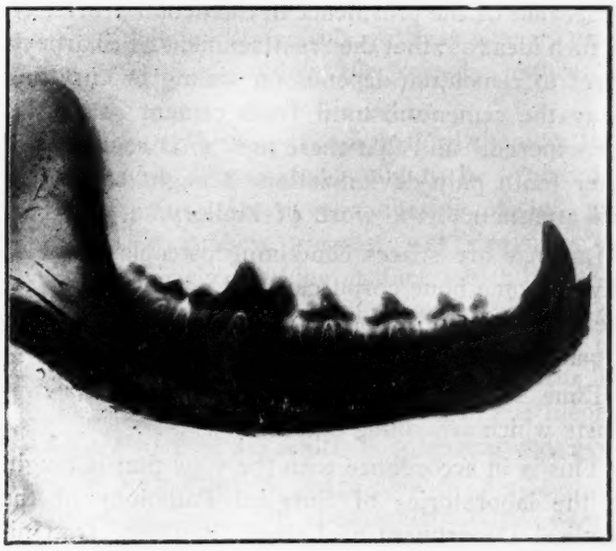

Plate 4.

tion is generally lacunated. A beautiful example of this is a tooth which had been extracted, boiled, and replanted by me. Two years later the tooth was removed by dissection. Histological study of celloidin sections showed numerous lacunae and thick layers of young cementum.

Septic dentine appears to cause in some way an excessive deposition of cementum from the alveolus wall.

All teeth, however, which bore no clinical or other evidence of inflammation, showed structureless cementum.

A study of the following plates will throw light on the nature of cementum and disprove the opinion that "between pulp inside and periosteum outside, there is a continuous chain of living plasm."

Plate 1 shows a section through the root of a replanted tooth.

[4]Noyes: Dental Histology, Page 179.

Granulations are partially detached from the root stump. An area of suppuration is seen at A.

This tooth had been boiled before replantation. At operation two years later, the tooth was found thoroughly septic.

Plate 2 shows a section of the same tooth with old cementum at A deposited before replantation.

Lacunated cementum at B was deposited after replantation. Here the layers of cementum are quite thick.

In the pericemental structure (C fibroblasts are seen clustered on the edge of calcic deposits; some being apparently submerged in the calcified tissue.

D is an area of resorption filled in by young cementum.

Because of the prevalence in the dental profession of such ideas as; that the "reattachment of Sharpey's fibres to cementum depends on scaling or curetting away the cementum until fresh cement corpuscles are exposed," and that there are "vital root apices" after tooth pulp devitalization, it might be well to call attention to the work of Mallory.[5]

Lacunae are spaces containing osteoblasts which have become bone corpuscles and as such have lost their power of proliferation and they no longer play a part in the regeneration of bone.

Bone regeneration must come from osteofibroblasts which are young osteoblasts.

This is in accordance with the view that is taught in the laboratories of Surgical Pathology of the Medical Department of Leland Stanford, Jr. University.

Plate 3 shows osteoblasts as they are in relation to newly formed bone and free on account of an artifact; when these cells become buried they can be considered as end products and their genetic function is at an end.

A. Calcified cartilaginous matrix.

B. Cartilage cells.

C. Periosteal bone.

D. Osteoblasts.

Stain-Hematoxylin and eosin. Obj. ½ in. Oc. 2 in.

Plate 4 shows the mandible of a fully grown dog killed under chloroform. The common carotid artery was exposed by dissection; this was followed up. The internal carotid was ligated as were all branches of the external carotid with the exception of the internal maxillary. A hemostat was applied to the internal maxillary beyond the point where the inferior dental was given off from it. The artery was washed out with saline solution; and mercury was run into the common carotid. The mandible was disarticulated. This was done with the idea of demonstrating the blood supply of the teeth so that the busy practitioner would have ocular evidence of conditions as they are.

The roentgenogram shows the inferior dental artery, the mental and muscular branches, and some of the arterioles leading to the teeth.

A diagram drawing by Dr. F. E. Blaisdell, Plate 5, of actual specimen made by pancreatic digestion. Shows the inner surface of left half of mandible of fetus. The course of the inferior dental artery can be seen. It shows anastomosing arteries entering the bone at the inner surface of the mandible. These twigs were from the lingual or mylohyoid. The specimen was broken during removal from the digesting fluid. Some of these twigs have been seen entering the bone in dissections on the adult cadaver. This blood supply is the rule in the young mandible, often persisting in part in the adult.

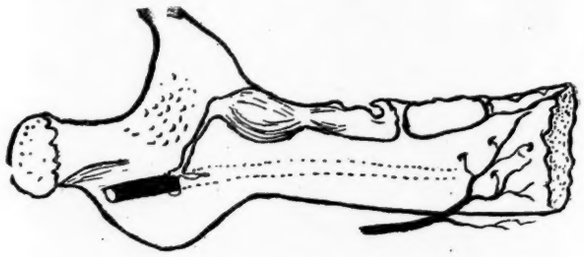

Plate 5.

Specimens at present in the Surgical Pathological Laboratories of Leland Stanford, Jr. University show this point very clearly.

The specimen was obtained from the cadaver of a male fetus.

Dissection exposed the left common carotid and subdivisions. All branches except the facial and internal maxillary were ligated. A canula was inserted in the common carotid artery. After the blood had been washed out with normal salt solution, alcohol followed by acetone, was injected. Celluloid dissolved in acetone, and colored with Chinese vermillion, was then injected.

This technic was repeated on the right side. A strong cord was tied around the neck and the head was severed from the body below the cord.

The head was then immersed in an aqueous solution of sodium bicarbonate and pancreatic ferment. The flesh was fully removed by digestion exposing the bone and the celluloid which had set inside the arterial walls. The specimen showed a very abundant anastomosis at the mental foramen and also at the genial tubercles. Arteries were observed lead-

[5]Mallory: Principles of Pathologic Histology. Page 65-75.

ing into the mixillary bones before the specimen was removed from the jar. During removal these fragile filaments were broken.

Better results will probably be obtained in the near future from the cadaver of an adult.

The preparation of these anatomical specimens is being done under the instruction of Dr. F. E. Blaisdell.

If in conclusion, we were to grant for the sake of argument that there is a continuous chain of plasm between pulp and the pericemental structure, would it not seem absurd to insist that the chain remains unbroken when the pulp is removed? How could the chain be maintained when the plasm could no longer circulate in the pulp chamber?

If the opinion that plasm circulates from the pulp chamber through the cememtum walls into the socket was sound, this would only be one more piece of evidence that pulpless teeth should be removed from the body because drainage from the septic dentine would take place not only by way of the apical foramen, but also by way of these imaginary lacunae and their still more imaginary Haversian systems.

Many vague statements have been made concerning the vitality of devitalized teeth and the possibility of filling them so that they will not be subject to infection. But no evidence has been introduced to prove that devitalized teeth are not dead. Such statements as "The commonly noted persistence of sensitiveness of root canal dentine after thorough pulp removal, suggests a cemental source of vitality, independent of the pulp" are quite misleading. The sensitiveness may suggest a chimerical source of vitality. But evidence proves clearly the lack of such vitality. The sensitive region is apical, as may be determined by amputating the root end. When the root end is removed, the sensitiveness disappears. Dentists generally know the pressure of air through the root end during canal instrumentation affects the sensitive nerve tissue below the root.

Has anyone any real evidence to offer concerning the vitality of devitalized teeth or the permanent immunity of them to infection? Can anyone inform me of a single devitalized tooth which six months after devitalization, did not show traces of infection? Can any one tooth be cited as an exception to the rule I have drawn as a conclusion from the examinations and cultures of hundreds of devitalized teeth; the conclusion that all devitalized teeth are dead, and, within six months from the time of devitalization, infected.

THE MODERN TREATMENT OF BURNS.

WILLIAM SENGER, M.D., F.A.C.S.
PUEBLO, COLORADO.

In the struggle to ease the patients' torment, no class of wounds has been treated in so many different ways as burns.

Five hundred years before Christ, India's treatment for this condition was allied to present methods—namely, using warmed, sterilized wax (but it was applied on a dirty rag). Through the centuries this method with little modification has sifted down to us. Man can remember when our grandmothers treated burns with a mixture of wax, tallow and balm of Gilead buds. To its efficacy we can testify—although, in our supercilious attitude toward home remedies, we relegated such treatment to that increasingly large class where "nature cures the disease while the remedy amuses the patient."

As is usual in most things medical the wax treatment almost disappeared—only to be replaced by varnish, paint, carron oil, adhesive plaster, gum. solution of rubber, greases, wet dressings and powders—nearly anything, in fact, which had as the underlying principle the exclusion of air.

To realize how little we knew of burns, only forty years ago physicians subscribed to the idea that "Death in burns is often due to the mephitic influence of foul air which is so extensively generated in such injuries."

In recent years the open air treatment has had many advocates. It was particularly noted that there was considerable relief from pain—providing, however, that the parts were immobilized and protected from friction. This made us realize that friction on nerve endings rather than air was the cause of pain.

When de Sandfordt a few years ago advertised his paraffin treatment of burns, there was little response;—first, because his "ambrine" was a secret preparation, exploited at exorbitant prices; second, because de Sanfordt was practically an unknown and his recommendations followed the fate so commonly dealt to ideas emanating from all but the noted in our profession; third, it seemed contrary to all ideas of asepsis.

The war finally forced the medical profession to recognize that something must be done to correct the frightful toll exacted by liquid fire. To accomplish this, the surgeon at the front adopted de Sandfordt's modernized application of the wax treatment, first employed 2,500 years ago. And thus the paraffin treatment came into its own.

At the Minnequa Hospital we care for approximately 13,000 employes of the Colorado Fuel & Iron Company. In such an industry the number of burned workers is large. During past years we tried various treatments only to condemn them after a more or less extended trial, until the paraffin treatment became available.

We have used various formulae of this preparation. We feel that several give as good results as "ambrine"; that is, if we use a paraffin which is low melting, elastic, adhesive and, most important, neutral in reaction.

Many modifications contain various antiseptics. The experiments of Sollman would indicate that such substances added to the paraffin are well nigh valueless. They remain locked up in the preparation, giving off little or nothing for sterilizing or stimulating the wound. On the other hand, the addition of eucalyptus, thymol, etc., is of value in substituting a better for a worse odor. As the result of our own investigations, we feel that the proper care of the wound at each dressing is to be regarded as the important factor next to having the paraffin fulfill the requirements already mentioned.

Depending on the depth of the burns our treatment varies. All superficial burns, irrespective of extent or location, are best treated by paraffin. The same is applicable to third degree burns if not large.

We have long been taught that a burn renders the part aseptic; yet how many remain so until the physician sees them? Dirty clothing and dirtier handling have rendered the parts surgically filthy. While it is impossible to sterilize the wound completely much can be done to improve conditions. We have, therefore, throughout the entire care of the case, practiced rigid aseptic technic—even though the treatment is largely antiseptic.

First endeavor to cleanse the parts. Gently and thoroughly wash the burn with Carrel-Dakin Solution—warmed just prior to application. Then dry with an electric blower. Next spray on a two per-cent solution of Dichloramin-T. After waiting a few moments, any loose tags of skin are trimmed away. Through each bleb pass a needle threaded with silk. Cut this off close to the margin of the bleb and leave in situ. This will allow the slow oozing of serum. Absorb any excess with blotting paper and once more dry the parts. Spray again with Dichloramin-T and apply the paraffin with an atomizer so as to insure practical freedom from pain during this step. Now apply a layer of sterile sheet cotton and paint this dressing with more paraffin, being careful that the dressing becomes closely adherent to the wound and about the edges. Complete the dressing with cotton pads and bandage. Each day the burn is dressed, following each detail as already described.

Burns thus treated heal with extraordinary rapidity. We do not know why this treatment, seemingly so contrary to modern surgical principles, produces such results. We lock up foul secretions containing various bacteria and the patient recovers in half the usual time. Can it be that the constant protection and immobilization of the tender new epithelium and granulations in the presence of moisture give them the opportunity to grow so rapidly that they ignore the presence of bacteria and literally overcome them by "mass attacks"?

When we consider extensive burns of the third and greater degrees, the problem is far more difficult. We believe it a mistake to use paraffin in these cases unless the parts involved are very limited. The sloughs of large tissue masses must be cleaned up in the shortest possible time. I believe there is nothing so efficacious as the Carrel-Dakin treatment applied in the same manner as for any serious laceration. Daily smears are taken from the wound and when surgically clean, skin grafts should be applied. The sooner this can be done, the better, in order to escape, if possible, keloid formation and contractures.

Skin contributed by friends and neighbors, while spectacular and given in kindness (and incidentally advertising the doctor) has proven of little practical value.

For so common a procedure as skin grafting there are many failures. We have adopted with success this technic:—As soon as the smears prove the wound clean, we apply autogenous Thiersch grafts to the surface after the granulations have been curetted and dried. Each graft should be sacrificed so as to allow free exudation of serum. No air bubbles should be allowed beneath the grafts. After application, we prefer the open air treatment with thorough immobilization of the part. Whenever secretions become excessive, they may be removed by gentle spraying with the Carrel-Dakin's Solution. Not until after the twelfth day is the wound otherwise disturbed. By this time the fate of the grafts is sealed and subsequent treatment should be that of any healthy wound.

Occasionally, however, in deep burns, so much area has been involved that sufficient autogenous Thiersch grafts cannot be obtained. In such a case we believe small island grafts the best substitute, although the probability of much more scarring must be borne in mind. Grafts over joint surfaces,

even if but partially covering the wound are essential to prevent contractures.

If in spite of all efforts, contractures impede the usefulness of a joint, or the scar continually breaks down, we have used the method recommended by Dr. J. S. Davis. One splits the scar tissue throughout its entire length. These "relaxation incisions" should be parallel, about two or three inches apart and down to healthy tissue. The scar gaps widely. The gap is filled with Thiersch grafts at once, if the wound be healthy; otherwise one should wait until a healthy granulating surface is obtained. I have used this method in three cases only, but it has proven most efficient.

Contractures producing webs may be treated as webs in any part of the body. This is a two stage operation.

At the first operation a round perforation is made at the highest point to be released. Into this perforation the skin edges are reflected and sutured. When this has healed completely, we have a permanent epithelial lined hole, and are ready for the next step.

The second operation then splits the constricting band from the perforation to the free border of the contracture. The margins are sutured and the contracture does not return. The only precaution to be used is to be certain that the perforation is made at the highest point of the contracture—otherwise the result is not perfect.

Conclusions:—

I believe that the paraffin treatment of burns has the following advantages:—

(1) Immobilizes the wound.
(2) Protects granulations.
(3) Stimulates epithelial growth.
(4) Greatly minimizes pain.
(5) Renders subsequent dressings easy and much more rapid.
(6) Prevents excessive scar formation.

Its limitations:—Third degree burns unless very small should not be treated by the paraffin method. In these cases, use Carrel-Dakin Solution to render the parts aseptic at the earliest moment; then skin graft to avoid scars if possible. If necessary, to combat scars, "relaxation incisions" or the "button-hole" operation with modifications give best results.

It is easier to suppress the first desire than to satisfy all that follow it.—Buy War Savings Stamps.

Buy what thou hast need of, and ere long thou shalt sell the necessaries.—Buy War Savings Stamps.

GASTRO-ENTEROSTOMY UNDER LOCAL ANESTHESIA; WITH REPORT OF A CASE.

MICHAEL CASPER, M.D.,
LOUISVILLE, KENTUCKY.

For several years I have been especially interested in the subject of local anesthesia, and have employed the method for the execution of a great variety of minor and major surgical procedures with considerable satisfaction to myself and without any serious discomfort to the patient in any instance. Contrary to the views of many surgeons, in my experience, the contra-indications to the local or conduction method of anesthesia have been relatively limited, provided the anesthetic agent be properly selected and the requisite care used in its administration. However, nothing in this report should be construed to mean that I am attempting to argue against the employment of any method of induction or general anesthesia, because that would be far from the truth. It is recognized that both methods have a distinct field of usefulness, and neither should be advocated nor employed to the exclusion of the other.

Case Report: M. R., a male, aged seventy-two, had for many years suffered from arterio-sclerosis; and there were also present all the other elements besides years which tend to make a man old. There was a distinct history of irregular vomiting, epigastric pain, anorexia; the patient was decidedly cachectic, and had lost thirty or forty pounds in weight. At the first glance, and based upon the history presented, the clinical diagnosis of gastric carcinoma seemed almost certain; and, indeed, that was my personal opinion. However, gastric analysis demonstrated the presence of no excessive amount of HCL and no foreign acids, which seemed to eliminate the possibility of carcinoma, althought this is not invariably true; in fact, the most prominent diagnosticians are not now placing much reliance upon chemical analysis of the stomach contents in connection with the differential diagnosis of gastric and duodenal lesions. It is known that gastric ulcer has been found present many times without an excessive amount of HCL, and it is also well understood that carcinoma may exist with an abundance of HCL present. Blood examination showed a low red cell count, hemoglobin 70%.

There was no history of food retention, and vomiting had not occurred invariably an hour or two after the ingestion of food as is usually true in duodenal ulcer—although this was the ultimate diagnosis. The retention test was negative; the patient

was given prunes and rice at night, and when the stomach contents were withdrawn the next morning these had entirely disappeared. However, since operating on this man I am inclined to think the technic of the stomach washing was not carefully executed, otherwise some retention would certainly have been noted. It may be the lack of retention may have been largely due to the hyper-peristalis which was present, this evidently being nature's effort to overcome the stasis produced by the healed duodenal ulcers.

Operation revealed multiple duodenal ulcers, and these ulcers in healing had made the condition of the patient worse than when they were in active existence. So long as the ulcers were active the pyloric orifice was open, but as soon as the ulcers healed contraction from the presence of the cicatrices caused stenosis. The resulting stenosis produced digestive disturbances, such as pain, belching, nausea, vomiting, finally anorexia and considerable loss in weight had occurred. The stomach contents were stagnant and foul, and the patient's breath had a peculiar putrid odor. When the stomach was opened the same foul odor was evident. This was probably due to putrefactive changes in retained articles of food.

This man had nephritis, cardio-vascular changes, and all the elements which make an individual really aged. He was so debilitated as to preclude the administration of a general anesthetic, and while it was thought some good might be accomplished by the performance of a gastro-enterostomy, just how this could be done in a man of his age and condition was the question which had to be considered. He was very anxious that the operation be performed, and we decided to undertake it under local anesthesia.

An hypodermatic injection of morphine 1/6 grain with atropine 1/150 grain was given one hour before beginning the operation and a 2% novocaine-adrenalin solution was employed for the local anesthetic. The abdomen was opened under this method of anesthesia without the slightest pain, the patient feeling comfortable during the entire operative procedure. The clinical diagnosis was verified, *i. e.*, that carcinoma was not present so far as the macroscopical appearances were concerned, and it also seemed reasonably certain that there were no carcinomatous changes in the healed multiple duodenal ulcers which were found present. Gastro-enterostomy was completed without difficulty.

Ordinarily in cases of this kind little pain results from careful visceral manipulation, and so long as the parietal peritoneum is not extensively disturbed the abdominal viscera can be handled as may be required although the patient remains awake; and that was true in this case. The only pain that occurred was when the jejunum was brought upward to make the anastomosis; the tension thus produced upon the mesentery or the parietal peritoneum caused slight pain, and during this part of the operation a small amount of ether was administered. It has been repeatedly demonstrated that the stomach can be drawn downward, an opening made through the meso-colon, and the transverse colon separated to expose the posterior wall of the stomach painlessly under local anesthesia; but in making the anastomosis proper a small amount of ether is usually required. However, a small quantity of ether acts as a stimulant and tends to overcome shock. This man's pulse was 80 when placed on the operating table, and it was still 80 when the operation was completed.

The time required to complete an operation of this kind under local anesthesia is about twice as long as under general anesthesia. The novocaine solution has to be injected into one layer of tissue, then the operator has to wait for a few minutes before he can proceed, then the next layer is injected, and so on. It is a mistake to attempt rapid work under local anesthesia; but by being deliberate an operation such as described can be successfully executed under local anesthesia in the majority of instances. The patient had little shock as a result of the operation, he reacted promptly, and was allowed to drink sterile water whenever he felt so inclined.

The operation was performed April 16th, 1918, and four days afterward the patient was given any kind of liquid nourishment he desired. Immediately after the operation he was placed in the Fowler position during the day and was allowed to assume the recumbent posture at night. The kidney function showed no variation at any time, and the patient made an uneventful recovery.

There was nothing extraordinary about the operation performed, it being merely a posterior no-loop gastro-enterostomy under local anesthesia. However, a new kind of catgut recommended by Young known as "gastro-enterostomy suture" was used. Ordinarily the commercial catgut is quickly absorbed when it comes in contact with the gastro-enteric juices. Young has devised a suture which resists absorption under these circumstances and will hold longer than other forms of chromic catgut. I have used it in perineorraphy and also trachelorraphy. The stitches remained intact for four weeks and had to be removed; so it must be resistant to other

fluids as well as the gastro-enteric juices. It has been found that when silk is used in gastro-enterostomy it sometimes perists and gives later trouble; in a few instances it has had to be removed. In this operation the "Young" catgut was used for the through-and-through or visceral sutures, silk being employed for the external sutures.

I might add that the röentgen ray is an important factor in the diagnosis of gastric and duodenal ulcer. The röentgenographic plate in this case was a splendid illustration of what may be expected from the *x*-ray in diagnosis. The healed ulcers were clearly outlined in the picture after the barium meal. The exact location and the craters of the ulcers were visible, and the hyper-peristalsis was plainly revealed under the screen.

It must be admitted that previous medical treatment had been successful in this case, in that the ulcers had entirely healed; but the patient was worse afterward than before because of the cicatrization. The more obliteration there is at the pyloric orifice, the better are the results obtained from gastro-enterostomy. This has been such a prominent factor that many surgeons now close the pyloric orifice entirely to insure permanency of their gastro-jejunostomy.

According to Farr, in considering the subject of abdominal surgery under local anesthesia, it is assumed that the requirements of the patient are paramount, and that all other questions are of secondary importance. While it seems to be the custom of surgeons to limit the application of local anesthesia to cases in which general anesthesia is contra-indicated, it is the author's belief that the reverse should be true, *i. e.*, that general anesthesia should be employed only when local anesthesia is contra-indicated. He states that the toxicity of novocaine is dependent upon the strength of the solution rather than the total amount used, and its comparative safety makes possible the use of the drug in large quantities. When so employed, with ample incision, careful manipulation, vertical retraction, and an appropriate position of the patient, its scope is greatly broadened. Perfect anesthesia results in negative intra-abdominal pressure, producnig post-mosten-like repose which permits optical examination which is, of course, preferable to digital. The author believes the contra-indications to local anesthesia are largely limited to: (a) psychic incompatibility, a small percentage of cases, not excepting children on this account; (b) pathological adhesions to the posterior parietal peritoneum; (c) adherent malignant disease; and (d) very high-lying gall bladders. It is claimed that with local anesthesia abdominal packs are unnecessary excepting to prevent soiling, orientation being obtained by the negative intra-abdominal pressure, vertical retraction, etc.; that it has the advantage of avoidance of the immediate and remote dangers of general anesthesia, excellent exposure and perfect repose of the viscera, greatly reduced trauma, and a marked decrease in post-operative discomforts, such as gas, nausea, and vomiting, with the resultant wound strain; in addition the avoidance of loss of consciousness to which most people strenuously object. Children, says the author, lend themselves especially well to this method of anesthesia. He has performed every abdominal operation by this method (some operations hundreds of times) and prefers it to all others. Should local anesthesia become inadequate, general anesthesia may be employed at any stage of the operation.

In local anesthesia for major operations, Scott claims it is unnecessary to apply the anesthetizing agent directly to the tissues to be incised, that it may be applied entirely outside the line of incision in such manner as to secure and maintain adequate anesthesia. This may be accomplished by thorough infiltration of the skin and subcutaneous tissues on the proximal side near the proposed line of incision, or in two lines, an inch or more apart, between which the incision is to be made. To assist in maintaining anesthesia adrenalin is added to the solution; this also has the advantage of reducing local bleeding during the operation. After the skin and subcutaneous tissues have been incised to the muscular tissues beneath, the fascia or aponeurosis should be anesthetized, especial attention being given to the nerve trunks when possible to locate them. The abdominal facia or muscular sheaths having been infiltrated and incised the subperitoneal tissue then presents; this is the most sensitive area encountered and "is not easily anesthetized if the operator is careless, unskillful, or hasty." The peritoneum is anesthetized by pressing the needle well into the transversalis fascia or posterior sheath of the rectus near the center of the wound. "When the abdonimal wall is properly anesthetized and a sufficiently large wound made to work without strong or rough traction, almost any kind of operation may be satisfactorily done within the abdominal cavity if it does not require much traction upon the mesentery or the separation of firm adhesions." The author states that the solution preferred for local anesthesia is one-seventh of one per cent. novocaine to which about three minims of adrenalin to the ounce is added at the time of operation. For

this purpose sterile adrenalin solution is kept in 1 ccm. amber glass ampules.

The principal advantage, says Jacobson, of local anesthesia over other methods is the all-important factor of safety. He believes that no operation on an adult should be performed under general anesthesia which can be equally well executed under local anesthesia. Novocaine 0.5%, with adrenalin, 3 to 5 drops per ounce, is the solution usually employed; the patient complains only during "pulling and tugging"; food may be allowed shortly after operation since there is seldom vomiting. The technic employed by Jacobson is essentially that of Braun and is familiar to every surgeon of average experience. He states that almost any operation which does not involve excessive traction on the viscera can be successfully performed under local anesthesia. This method is particularly indicated in the presence of alcoholism, nephritis, acute pulmonary lesions, and necessary abdominal operation concurrent with myocarditis, suprapubic cystostomy, gastrostomy, jejunostomy, enterostomy, cholecystostomy in debilitated patients suffering from cholecystic empyema or intense choloplania from common duct obstruction, appendicectomy in tuberculous patients, and operation for every variety of hernia and for typhoid perforations, should be executed under local anesthesia. The author has performed one hundred and forty abdominal operations under local anesthesia, one hundred and twenty-five of which were for hernia. He has found the method of great help when combined with general anesthesia to lessen extreme rigidity of the abdominal muscles.

For local anesthesia Regnault prefers novocaine-adrenalin or novocaine-suprarenin. Under such anesthesia he has performed major operations, such as arm amputations, foot amputations, operations for appendicitis, ovarian cyst, etc. In nine nundred operations during the war he has used local anesthesia in about three-fourths of the cases.

Cole presents a resumé of one hundred and fifteen major operations performed in his clinic under local anesthesia within the last two years. The series includes eighty-seven abdominal operations, involving the appendix, the cholecyst, the stomach, the intestines, the ovaries and the uterus; nephrectomy, radical amputation for mammary carcinoma, skull decompression, orbital exenteration, etc. Seven abdominal operations were performed during pregnancy without maternal mortality; there were seven major operations upon children under two years with one death from bronchopneumonia twelve days after the establishment of a Littré artificial anus in a child three days old. Forty-seven patients were between the ages of fifty and eighty-seven, with a mortality rate of 4.5%—two deaths. The first occurred eight days after enterostomy on the fifth day of ileus and peritonitis in a patient of sixty-five; the second four days after drainage on the sixth day of peritonitis in a patient of sixty-eight. Cole concludes that the selection of local anesthesia as the method of choice in cases offering grave mortality risks is a factor of safety too potent to be neglected.

ANO-RECTAL SURGERY UNDER LOCAL ANESTHESIA; WITH CASE REPORTS.

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The question of local anesthesia in ano-rectal surgery is of especial importance for two reasons: First, there are many individuals the subjects of remediable ano-rectal pathology to whom the administration of a general anesthetic would be distinctly dangerous, yet the necessary operative procedures may be safely and satisfactorily executed under local anesthesia: Second, in other instances, because of inordinate fear of a general anesthetic, the aid of surgery is refused or postponed by patients until the supervention of irremediable complications or sequelæ which could have been prevented, had they known operation could be successfully performed under local anesthesia.

For many years after the popularization of local anesthesia for the execution of minor and even major surgery in other anatomic situations, the feasibility of successful performance of painless operations upon the ano-rectal structures without the administration of a general anesthetic was seriously questioned. The reasons suggested for failure to secure satisfactory local anesthesia were: (a) the extreme sensitiveness of the tissus in this region, and (b) more profound anesthetization is required to permit complete sphincteric divulsion than for surgery in other localities. However, as the need for a satisfactory local anesthetic in ano-rectal surgery gradually became more and more apparent, renewed experiments were made with the various agents in vogue.

Reclus (1889) was the first to satisfactorily anesthetize the ano-rectal region by local measures to permit painless dilatation of the sphincter muscle. He employed cocaine in one to two percent solution. The subject was further elaborated later by Schleich (1894) and many other observers. And excepting for the local agents used, variations in strength of the solutions, etc., the present technic of tissue in-

filtration for the induction of local anesthesia in the ano-rectal area is practically identical with that advocated and practised by these pioneers in the field of local anesthetics.

I am in perfect accord with the views of Allen and many other observers that operations under local anesthesia in this highly sensitive area must be performed with great care, and it naturally follows that any local method of inducing anesthesia must be executed with accuracy and thoroughness to insure a successful outcome. In my opinion weaker solutions should be used than those ordinarily recommended for operations in other anatomic situations.

Allen advocates the following method as being simple, quickly executed and absolutely reliable in the production of perfect surgical anesthesia in the ano-rectal region, and states that he uses it almost invariably in preference to general anesthesia in operating for hemorrhoids, fissure, prolapse, etc. The tissues are first infiltrated subcutaneously around the anus at the muco-cutaneous junction; it is advisable to begin about an inch away in the less sensitive skin and advance toward the anal region where the injection is made circumferentially, than to make the first puncture in this highly sensitive area which will always excite complaint; and in nervous patients, because they become uneasy and lose confidence in the promise of a painless operation. He advises a spray of ethyl chloride on the skin at the point of puncture protecting the anus from contact with the spray by holding a gauze sponge against it. I have not found it necessary in any case to use the ethyl chloride spray as stated since the puncture may be made practically painless by pressure of the skin between the thumb and finger. The circumferential injection is made subcutaneously, as the skin and mucous membrane at their point of junction are very thin, and intradermal injection is unnecessary. By drawing the skin outward with one hand the tissues are stretched thus obliterating folds and creases, making transfixion of a fold with the production of pain less likely. The solution is injected as the needle is advanced; for each reinjection one should start "just back of the point where the needle last stopped." Having completed the circumferential injection, the finger is inserted into the rectum as a guide and a large syringe and long needle employed; the needle is passed through the anesthetized cutaneous area and directed upward into the anal sphincter injecting as the needle is advanced; four points are injected, viz., each side, in front, and behind. Anesthesia results almost immediately, when dilatation can be as thoroughly practiced as under a general anesthetic.*

During early experimental work the greatest difficulty encountered under local anesthesia was the inability to completely divulse the sphincter muscle, which is a primary and essential feature in practically every ano-rectal operation. It was finally determined that by injecting a considerable quantity of a weak solution of the local anesthetic agent into the muscle itself, complete sphincteric divulsion could be satisfactorily accomplished.

The technical details incident to the induction of local anesthesia have been modified and improved, both as regards the sphincter muscle and the tissues requiring removal, until a practically perfect method now exists, and the possibility of satisfactorily performing ano-rectal operations without the administration of a general anesthetic is an established fact.

The advantages of local anesthesia in ano-rectal surgery cannot be overestimated; particularly is this true when the patient has an inordinate fear of a general anesthetic, and when, in the presence of cardio-vascular or renal disease, high blood pressure, advanced tuberculosis, etc., the administration of a general anesthetic would markedly increase the clinical risks. The pertinent facts cannot be ignored that certain patients to whom a general anesthetic might be safely administered have greater fear of the anesthetic than the contemplated surgical procedure, and that many individuals continue to suffer from remediable ano-rectal disease who would willingly submit to operation did they understand it could be safely and painlessly executed under local anesthesia. Moreover, if it were known by patients who have great fear of a general anesthetic and who in consequence postpone indefinitely necessary ano-rectal operations, that adequate relief could be secured under local anesthesia, undoubtedly many cases of rectal carcinoma could be prevented. The supervention of malignant disease upon benign rectal lesions is an important factor which should not be overlooked.

To secure the proper degree of anesthesia local injections should be made at several points, as suggested by Allen, those usually selected being about an inch from the anal verge anteriorly, posteriorly, and laterally. Let it be again emphasized that divulsion of the sphincter muscle is necessary as the primary step in the majority of ano-rectal operative procedures; even where it is possible to excise the diseased tissue without sphincteric divulsion, it still

* Abstracted with Modifications from Allen "Local and Regional Anesthesia."

is required: (a) to lessen post-operative pain, and (b) to obviate subsequent sphincteric contraction and relaxation which might markedly interfere with the healing process.

Among the reasons given for failure to secure satisfactory ano-rectal local anesthesia are: (a) the selection of an unsuitable anesthetic agent, (b) one whose toxicity is so great that fear of systemic poisoning tends to prevent the employment of a sufficient quantity to produce the desired effect, and (c) imperfect technic in the introduction of the selected agent into the tissues sought to be anesthetized. Therefore, selection of the anesthetic agent is a matter of considerable importance. Cocaine should never be employed in ano-rectal surgery for reasons which are too obvious to require enumeration. Some surgeons prefer quinine-ureahydrochloride, whereas others consider novocaine or apothesine more satisfactory for the purpose.

The following ano-rectal surgical procedures have been satisfactorly executed under local anesthesia: operations for external and internal hemorrhoids, benign rectal neoplasms, anal fissures; divulsion of hypertrophied and irritable sphincter muscles; curettment or excision of ano-rectal ulcers of whatever type; opening of ano-rectal abcesses; excision of ano-rectal fistulae; operations for anal pruritus, etc. It must be obvious, however, that total excision of the rectum for carcinoma, or for extensive syphilitic stenosis, would be difficult or impossible of satisfactory accomplishment under any form of local anesthesia.

In the subcutaneous introduction of a local anesthetic agent in any anatomic situation, the importance of "pressure anesthesia" in the prevention of undue pain from needle puncture must always be remembered. By grasping the integument between the thumb and fingers and exerting pressure just short of the production of so-called "pressure pain," the needle may be inserted without much discomfort to the patient. For the induction of local anesthesia in ano-rectal operations, the skin and subcutaneous tissues are first injected, the anesthetic agent being subsequently introduced into the deeper structures as required during execution of the operative steps.

The subjoined case records are presented as illustrating several types of pathology which may be successfully treated by appropriate surgical measures under local infiltration anesthesia. The administration of a general anesthetic seemed distinctly inadvisable in any of these cases for reasons which may be readily understood.

CASE 1. A. S., a male, aged forty-eight, superintendent of a large manufacturing plant. He was an individual of average physique, fair muscular development, but very pale and had a worn, exhausted appearance. His respirations were rapid and he had apparently lost considerable in flesh. The patient was referred to me because of "hemorrhage from the rectum."

Present complaint: Inability to work, easily exhausted, dyspnea constant, increased by exercise; constipation; digestion impaired; loss of much blood during each act of defecation, occasionally at other times.

Personal history: The patient claimed to have been healthy and active all his life, but had been greatly annoyed for the last twenty years by protruding hemorrhoids which began to bleed eight or ten years ago. During the last two years hemorrhage had steadily increased, and for more than a year the effect on his general health had become more apparent. Family history negative.

Examination: The patient was weak and faint, dyspnea was marked, and he moved and talked with considerably difficulty. Heart: mitral regurgitant murmur present, apex displaced. Feet and legs to knees greatly swollen and pitting was noted on pressure. Heart action rapid, irregular, intermittent. Hemoglobin, 70%. Albumin and granular casts present in urine. His condition seemed to preclude the administration of a general anesthetic. Rectal examination revealed several large interno-external hemorrhoids which bled profusely when everted; the rectal mucosa was not ulcerated but very thin and bled upon slightest touch.

Operation: Preparation of the rectum and surrounding region the same as for operation under general anesthesia; operative steps executed under local infiltration anesthesia. About one ounce of a one-quarter of one per cent solution of novocaine-adrenalin having been already prepared, an ordinary hypodermic syringe with long needle was used for its introduction into the tissues. While special syringes may possess some advantages they are unnecessary in my opinion. Injections were made at four different points; the needle was first inserted obliquely just through the skin in the anterior median line at the junction of healthy and hemorrhoidal tissue and the solution deposited as it was slowly advanced around the protruding hemorrhoidal mass, about 4 c.c. being injected for each one-fourth of the rectal circumference. The needle was then withdrawn and inserted in the posterior median line and the solution injected as before; then again withdrawn and introduced laterally (each

side) and the process repeated, thus completing the circle. Then at four equidistant points the needle was inserted into but not through the sphincter muscle, and 4 c.c. of the solution was likewise deposited in each quarter of the sphincter. The anal canal was then again carefully cleansed with soap and water. Within a few minutes anesthesia was sufficiently profound to permit complete divulsion of the sphincter thus bringing the hemorrhoidal mass into full view. The excision and immediate suture operation was then performed without difficulty, the patient complaining of but little pain. I might add that during the operative procedure some of the deeper tissues were anesthetized by injecting a small quantity of the solution whenever a sensitive point was reached. The "Asman and tube" was then inserted, the usual outer dressing applied, and the patient put to bed without shock.

The post-operative period in no way differed from that noted where similar operations are performed under ether. Prompt healing occurred and the ultimate outcome was perfect.

CASE 2. Dr. T. D., male, aged forty, a busy general practitioner, came to me complaining of intense pain in the anal region. He stated that time did not permit of his going to the hospital for treatment, and that he had great aversion to the taking of a general anesthetic. He asked if palliative measures would not suffice to give him at least temporary relief and enable him to continue his work. His general physical condition had no bearing upon the rectal lesion, his trouble being purely local.

Rectal examination disclosed two large thrombotic hemorrhoids at the posterior anal verge, and between them in the median line there came into view, when he was asked to strain as if defecating, an anal fissure which extended almost through the integument. It was undoubtedly this fissure which had caused the most of his pain. Replying to the question which he asked before the examination began, concerning the value of palliative treatment by local applications, etc., I suggested that surgical excision of the hemorrhoids and the anal fissure under a local anesthetic and closing the wounds by suture, would give him much speedier and more enduring relief than ointments or other local applications which might be prescribed. He was suffering intense pain at the time and readily agreed to my suggestion.

A sufficient quantity of the local anesthetic agent already mentioned, in one-quarter of one per cent solution, was injected just under the skin along the line of the proposed incision, and into the tissues beneath the anal fissure and the hemorrhoids; then with scissors curved on the flat the hemorrhoids and the diseased tissue lining the anal fissure excised; the wound edges were loosely opposed with catgut sutures. A small piece of gauze dusted with stearate of zinc powder was then applied and held in place by strips of adhesive plaster. The patient was permitted to continue his work and requested to report the following day, which he did, saying that while the parts were somewhat tender he was entirely free from the throbbing pain which had been produced by the hemorrhoids and fissure. The wound was re-dressed from day to day, union progressed satisfactorily, and within ten days healing was complete.

CASE 3. J. M., a male, aged sixty-eight, had been in bad general health for several years, and in addition he was the subject of locomotor ataxia. He had suffered from large hemorrhoids for a number of years which protruded during defecation. When asked to see this patient in consultation he was just recovering from a severe attack of pneumonia. His hemorrhoids had protruded for about a week, the attendant being unable to replace them because of an unusually tight sphincter muscle.

Examination showed that the large protruding hemorrhoidal mass was very dark in color and at two points beginning gangrene was evident. The condition of the man's lungs, his weakened physical state, and the fact that he had sugar in his urine, precluded the administration of a general anesthetic. Accordingly after the application of a soap poultice for several hours and careful cleansing of the protruding mass, he was operated upon under local anesthesia, the method of its introduction being practically the same as described in Case 1. The patient made an uneventful recovery, and so far as the hemorrhoidal operation was concerned, was ready to leave the hospital before he was entirely well of his pneumonia.

CASE 4. R. S., a male, aged thirty, an active vigorous looking man, butcher by occupation. This patient came to me complaining of severe pain in the peri-anal region and gave the following history: Six years previously he had a large ischio-rectal abscess which was allowed to rupture spontaneously and discharge. The external opening finally closed but reopened at intervals of two or three months. A physician whom he consulted four months prior to the date of my observation told him that he had an ano-rectal fistula which could be cured by the injection of bismuth paste. This treatment was accepted and the bismuth paste accordingly injected.

The external opening of the fistula closed within a short time, and the patient thought he was well.

A few months later, however, pain in this region again became intense and he was referred to me for examination and treatment. This man was unwilling to take a general anesthetic which probably accounts for his accepting the bismuth paste treatment a few months before. He stated, however, that he was willing to bear any reasonable amount of pain if an operation could be done, as he expressed it, "without putting him to sleep."

Rectal examination disclosed a small internal opening between the two sphincter muscles. The fistulous tract which showed marked induration could be easily traced to the former external orifice. It was apparent that considerable dissection of tissue would be necessary to completely excise the diseased area.

The same strength solution was employed for infiltration anesthesia as in the other cases. The first injection was made on a line immediately over the fistulous tract, anesthetizing the skin and adjacent tissue on each side; then with a long needle the tissues underneath the tract were anesthetized as well as possible. The skin and intervening tissue then being incised, the indurated area surrounding the fistulous tract was carefully dissected and removed from the outer end to and including the tissues surrounding the internal orifice. In the excision of several branch sinuses additional infiltration with the anesthetic solution was required. The dissection was continued until the entire area involved in the fistulous tracts was removed. The resulting cavity, which was quite large, was packed with gauze and after the insertion of the "anal tube" the usual outer dressing was applied. Because of the shape of the wound and the large amount of tissue removed, immediate suture was impossible, and the wound was allowed to heal by granulation from the bottom.

A perfect result was secured, the patient leaving the hospital in three weeks. Healing of the entire wound was complete in about eight weeks. This case shows that extensive operations for ano-rectal fistula can be successfully performed under local anesthesia.

An interesting feature in connection with this case is that the fistulous tract, instead of being about the size of a slate pencil as these sinuses usually are, was more than one inch in diameter; and inside this main tract was found at least a dram of the bismuth paste which had been injected by the physician who had formerly treated the patient.

If you would be wealthy, think of saving as well as getting.—Buy War Savings Stamps.

THE VALUE OF HEXAMETHYLENE-TETRAMINE PROCTOCLYSIS AS A POST-OPERATIVE MEASURE.

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The use of hexamethylene-tetramine after major operations has been my practise for many years and its physiological effects have been demonstrated by its action on certain organs. Many physicians recommend it as a valuable antiseptic for the genito-urinary system, but aside from this use its therapeutic value had been somewhat limited.

Experimental and clinical studies in recent years have taught us that it is indicated not only for diseases of the uro-genital tract, but that it has a specific action on the cerebro-spinal system, the mucous membranes of the nose, throat, and the bronchial tubes and also on the alimentary canal.

Flexner has demonstrated that the terrific damage produced in the anterior horns in acute anterior poliomyelitis often is prevented if hexamethylene-tetramine is used in the early hours of this disease. This is vitally important as we are well aware of the paralyses that usually occur with this serious infection.

The rhinologist uses this drug in the every day nose and throat conditions and the internist has recently added it to his armamentarium for combating pneumonia.

In searching the literature on post-operative treatment I find that practically nothing of importance is mentioned of the therapeutic value of hexamethylene-tetramine after abdominal operations. It is an established fact that after some abdominal operations, certain toxins have a tendency to attack the excretory organs. These toxins sometimes tend to inhibit the function of the kidneys and intestines, producing an auto-intoxication which manifests itself in the form of kidney insufficiency or acute intestinal stasis. The toxemia is the result of the action of numerous infectious agents which have gained entrance into the system through various channels. To offset the damage that is produced by these invading bacteria after operation, it seems perfectly rational to administer an antiseptic substance that acts on the genito-urinary tract and the alimentary canal.

For a long time it became somewhat of a routine

measure for me to order for my post-operative cases the following solution by mouth.

℞

Hexamethylene-tetramine grs. x

—

Aquae Destillatae O s/s

M.et Sig:—

℥i. q. half hour.

This treatment was begun as soon as vomiting ceased and it proved to be a valuable measure after abdominal operations. Catheterization was rarely necessary, thirst was greatly relieved, abdominal distention seldom occurred and it acted as a prophylactic to post-operative intestinal stasis. The only disadvantage of this method was that the solution could not be administered by mouth in cases of persistent post-operative vomiting or when there was unconsciousness. Now I have the solution given by rectum, using the same principle that is practised in administering the Murphy drip.

To render hexamethylene-tetramine effective, it is advisable to add to the solution acid soda phosphate or some other acid medium. Eight ounces of the combined solution may be administered three or four times daily.

The Murphy drip frequently acts as a life saver in the presence of hemorrhages and when the system has been drained of considerable fluid. Clinical experience with saline proctoclysis has convinced us that the bowels are capable of absorbing immense quantities of fluids which help to restore blood pressure, favor the dilution and elimination of toxins, promote peristalsis, relieve gaseous distention and produce a stimulating action on the heart and circulation.

Saline proctoclysis is sometimes irritating when given in large quantities and numerous observers claim that it interferes with the function of the kidneys on account of the excessive amount of chlorides that are absorbed by the system.

Hexamethylene-tetramine proctoclysis has an advantage over saline solution in that it has the additional properties of a urinary disinfectant and an antiseptic of the alimentary canal including the gall bladder and bile passages.

*In discussion of Charles H. Mayo's paper on the Etiology, Symptoms and Treatment of Gall Bladder Disease before the Bronx County Medical Society in January 1916, I attempted to emphasize the importance of hexamethylene-tetramine proctoclysis as a post-operative measure following cholecystectomy and cholecystostomy.

*Mayo-New York Medical Journal 3/4/16.

Bacterial infection should be considered one of the prime factors in the etiology of diseases of the gall bladder and biliary passages. Inasmuch as constipation is more prevalent in women, this condition would be an important factor in loading upon the liver a great number of bacteria which have ascended from the colon or have migrated to the liver by way of the portal circulation. This probably explains the prevalence of gall bladder disease in women.

Cholelithiasis should be considered one of the end results of biliary infection and when we drain or remove the gall bladder because of stones, it does not necessarily mean that the underlying cause of this condition is removed. To effect a complete cure, we should endeavor to treat the primary source of the infection, and we therefore should attempt to destroy the bacteria and their toxins. This can be accomplished by administering a therapeutic agent that acts directly on the alimentary tract.

1882 Grand Concourse.

Deaths From Venereal Diseases.

Venereal diseases are communicable and highly dangerous, and as communicable diseases they must be guarded against, according to State and national health authorities. The silence regarding these diseases has been due to their connection in many cases with immorality. The other phase of the subject, namely, the spread of the disease to the innocent as well as the immoral, will come into prominence with the nation-wide effort to curb the evil which threatens society.

The necessity of prompt and drastic action in making known the danger from venereal disease is evident when the increased possibility of infection, due to war conditions in this country and abroad, is considered. Every war up to date has been followed by a large increase in these diseases. The estimated number of deaths in 1916 due to venereal disease in the United States was 250,000. Osler puts syphilis next to tuberculosis, pneumonia and cancer as a death-dealing agent. In New York in 1914, of 25,653 cases of disease reported 28 per cent were syphilis, 21 per cent tuberculosis and 13 per cent diphtheria. Such figures indicate only a small part of the damage done society by the disease. The injury to the future children of the race and to innocent people now free from infection cannot be estimated. The time to talk and talk frankly has come.—*Maine Health News Bulletin.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, FEBRUARY, 1919.

TESTS FOR RENAL FUNCTION.

An evaluation of kidney function is of interest to the surgeon and to the internist. A careful consideration of what the patient's kidneys can do or may be called upon to do, not infrequently will alter the surgeon's point of attack as well as his entire course of treatment; and this appraisal of kidney function is applicable in every branch of surgery as well as in the particular field of genito-urinary diseases.

The pathologists studied and grouped kidney diseases according to the pictures they found at autopsy. In this way our clinical impressions of the living patient were made to conform, if possible, with the anatomic picture of the dead patient's kidneys. Of the true physiological and chemical processes of the living kidney, we had but little idea and could, therefore, have no standard for measuring kidney usefulness in health and in diseases. It is obvious that for the physician and patient also the chief interest would be in the question what could the kidney do, and not in the realization of how much anatomic change the organs may have undergone; for it may well be that the moderately, or even fairly well advanced, change in the structure of the kidney may impair its function but little while, in a striking measure, the converse may be true.

This entire question has been quickened and brought into fresh interest by modern workers who have made it apparent that the kidney possesses a range or, better still, an index of function in its capacity to excrete water, salts, solids in general, and foreign dye. Moreover, others have demonstrated that inability on the part of the kidneys to properly filter or secrete produces an accumulation in the patient's blood of the waste products of metabolism, and that these products are deleterious and that they can be measured with considerable precision.

Much can be learned from the study of a single fresh specimen of urine or from a 24-hour specimen of urine. The presence of albumen denotes distinct kidney impairment and when albumen is present with a negative sediment lues should be carefully ruled out.

The urine of healthy kidneys varies in concentration, depending upon the diet, mode of life, etc. The amount of solids in the urine will fluctuate, the normal kidneys evidently presenting no barrier to the ebb and flow of urinary change. In the diseased kidney there is a barrier and this is evidenced by the fact that the urine maintains practically a sustained low level of concentration of solids. This phenomenon has been called "fixation of specific gravity," and is manifest particularly in the night specimens of urine when the patient has been at rest and has partaken of no food or fluid. This principle has been carefully worked out, notably by Mosenthal, who has devised a test which is applicable in a simple manner in every-day practice.

The phenolsulphonephthalain test demonstrates the ability of a kidney to excrete a foreign dye. The test was proposed and adequately described in 1910 by Rowntree and Geraghty. Its use is very general and it presents no difficulty in its routine applicability. For these reasons it has supplanted the use of methylene-blue and indigo-carmin and has made the phloridzin and cryoscopy tests almost obsolete.

The study of the blood may be very valuable. Determination of the urea nitrogen in the circulating blood may vary greatly from the normal, but we may learn much if we understand the rate and thoroughness with which the kidneys may be capable of excreting this urea nitrogen from the blood into the urine. And this relationship can be expressed as a co-efficient or index of urea excretion. In the same way we may study the amount of non-protein nitrogenous waste products in the human blood and ascertain the incoaguable total nitrogen, the uric acid, and the creatinine—our results may be illuminating.

Ambard worked out a formula for this index

which has been modified and made simple by McLean.

Finally though strictly not tests for renal function, one should not fail to take proper blood pressure readings and to interpret the significance of systolic and diastolic pulse tension; nor should one neglect to examine the fundi of both eyes.

A proper plan for the determination of kidney function is now feasible. We may learn what the kidney may do when at rest or when called upon to take care of unusual amounts of solids, water or dye. We may learn if the kidneys have been so impaired that they have become obstacles to the proper elimination of metabolic products. Our interest is no longer in the anatomic pathologic change in the dead non-functional kidney but rather our interest lies now primarily in an evaluation of the margin or residue of usefulness in the living, functionating kidney.—H. R. M.

ARTIFICIAL RESPIRATION.

The Third Resuscitation Commission, under the auspices of the Committee on Safety Rules and Accident Prevention of the National Electric Light Association, at its last meeting considered various efficiency methods of artificial respiration for emergencies as they are met with in peace as well as in war. This Commission, created about six years ago, has been investigating various phases of artificial respiration, including the mechanical and manual methods, and its conclusions, as reflected in resolutions adopted, merit careful consideration by the medical profession, medical colleges, hospitals, ambulance surgeons, fire and police departments, industrial plants, and the general group of persons interested in first-aid work.

It is significant that while there is an increased tendency to utilize mechanical devices, general dependence must continue to be placed upon the prone-pressure or Schäfer method, because of its ready availability when apparatus for resuscitation is far from the scene of the accident. Reliance upon the use of special apparatus tends to diminish the efforts to train persons in the manual methods, and apparently discourages the prompt and persevering use of non-mechanical methods. Dependence upon the theoretical value of mechanical methods not infrequently deprives patients of the opportunity of receiving uninterrupted and continued artificial respiration because of the desire of a physician or police officer to hasten the removal of the patient to a hospital, thus increasing the risk of unsuccessful attempts at resuscitation.

It is unfortunately true that in many instances the methods of artifical respiration have received inadequate attention in hospitals and medical colleges, so that satisfactory handling of patients requiring this form of treatment is not always secured promptly.

In view of these facts, the following resolutions adopted by the Third Resuscitation Commission at its meeting, May 17, 1917, command careful attention:

"1. The prone-pressure or Schäfer method of resuscitation is preferable to any of the other manual methods.

"2. Medical schools, hospitals, fire and police departments, the Army and Navy, first aid associations, and industrial establishments in general, should be urged to give instruction in the use of the prone-pressure method of resuscitation.

"3. Individuals who, from accident or any other cause, are in need of artificial respiration, should be given manual treatment by the prone-pressure method immediately on the spot where they are found. It is all-important that this aid be rendered at once. The delay incident to removal to a hospital or elsewhere may be fatal, and is justifiable only where there is no one at hand competent to give artificial respiration. If complications exist or arise, which require hospital treatment, artificial respiration should be maintained in transit, and after arrival at the hospital, until spontaneous respirations begin.

"4. Persons receiving artificial respiration should, as much as possible, be kept warm and the artificial respiration should be maintained till spontaneous breathing has been permanently restored, or as long as signs of life are present. Even in cases where there is no sign of returning animation, artificial respiration should be kept up for an hour or more.

"5. A brief return of spontaneous respiration is not a certain indication for terminating the treatment. Not infrequently the patient after a temporary recovery of respiration stops breathing again. The patient must be watched and if normal breathing stops, the artificial respiration should be resumed at once.

"6. Artificial respiration is required only when natural respiration has ceased. In cases of simple unconsciousness from any cause in which natural respiration continues, artificial respiration should not be employed without medical advice.

"7. The Commission recommends that in cases of gas asphyxiation, artificial respiration, whether given by a manual method or by special apparatus, should be combined when possible with the in-

halation of oxygen from properly constructed apparatus.

"8. With regard to the employment of mechanical devices for artificial respiration the Commission feels that it ought not at present to take a definite stand either for or against any particular form of apparatus. However, the Commission recommends, that the use and installation of apparatus should be confined, for the present, to properly equipped institutions under medical direction. The Commission recognizes the great need of simple devices capable of performing artificial respiration reliably and efficiently. It therefore recommends a careful study of the problem, directed toward *the development of a reliable method appropriate for general adoption.* Such studies can best be carried on in properly equipped hospitals and laboratories which offer opportunities and facilities for critical observation and experimentation."—I. S. W.

INFLUENZAL COMPLICATIONS.

Now that the epidemic of so-called Spanish Influenza is passing and we have time to take stock of the various phenomena that it has presented we are struck rather forcibly by the peculiarity of its complications. Resembling the grippe that we have had with us for years it differs from it in the paucity of complications involving the ears and the upper air passages. During the main epidemic the only complications—or almost the only complications—were pulmonary. Pneumonias of a peculiarly toxic type, bronchopenumonia involving large areas to which an unusually large proportion of the patients succumbed. In the ordinary grippe, such as we are accustomed to see every winter there is a relatively large number of cases that develop otitis media. In most instances this acute otitis subsides either with or without myringotomy. Sometimes it persists and a chronic purulent otitis supervenes. In a number of cases mastoiditis dedevelops and the patients come to operation. The proportion of these cases vary slightly from year to year but the mean is almost constant.

In another group of cases, determined probably by anatomical considerations, there are accessory sinus complications which may or may not require surgical interference. The number of these cases too remains fairly constant from year to year.

In this epidemic on the other hand, there has been a notable absence of these usual complications or sequelae. In a few instances, very few considering the pandemic character of the infection, there have been otitic manifestations. Some of these have been followed by mastoiditis but it seems to be the consensus of opinion that this number has been disproportionately small.

There has been, almost universally, a very red and markedly congested pharynx. The nasal mucosa and that lining the sinuses has been similarly involved and it is to this engorgement that the very frequent epistaxis is due. Many of the patients complained, especially during the pyrexia, of severe headache, usually frontal. The headache subsided with the fall of the temperature and the lessening of the nasal engorgement. It is more than likely that much, if not all of the headache is due to the swelling of the mucosa lining the accessory sinuses with consequent pressure and damming back of secretions.

Whether these patients will show later developments along these lines or whether they will be more than ordinarily susceptible to the diseases of the upper air passages such as we see every winter the cold weather season will demonstrate.

L. K.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

THE WORK PRESCRIPTION.

Occupation therapy, and, indeed, all reconstructive work for soldiers suffering physical and mental handicaps must be begun early in order to achieve most successful results. Increasing importance is being attached by physicians in military and other hospitals to the provision of scientific ward occupation at the earliest possible moment in hospitals. In fact, it appears to be a fundamental principle that ward occupations are a necessary part of the process of rehabilitation. The Federal Board for Vocational Education has issued, in its Re-education Series, *Bulletin Number* 25 dealing with the entire question of "Ward Occupations in Hospitals." In this pamphlet there is pointed out the difference between mere "busy work" that possesses practically no therapeutic justification other than that arising from its diversional character and real occupations. Obviously, occupation possessing social and economic value to the patient are of greater therapeutic value than those which, while recreational, are weak on the side of vocational or educational content.

Ward occupation has not been sufficiently regarded in its normal relations to technical training and placement in industry, but a larger volume of experience indicates that later steps are successful in due proportion to the inspiration secured from

ward occupations, together with the development of concentration, application and the will to "Carry on." Dean Allen Cullimore of Delaware College states "This assignment" (ward occupation) "should take place at the latest on the next day following his arrival at the hospital—an interval of a week in idleness is fatal."

While it is true that hospital patients are there preeminently for medical treatment, their physical condition is of primary concern, and all ward occupations should be studied with relation to their therapeutic values, including both the psychological and physiological possibilities. An improved mental condition and a more optimistic outlook on life most naturally results from a diverting occupation which allows wounds and distress to be relegated to a position of secondary interest. It is of no inconsiderable value to attempt to normalize mental states, but this becomes possible only after an investigation of the methods utilized. General mental states cannot be attacked on a single line without most careful discrimination any more than all physical states are curable by the identical drug. Similiarly, ward occupations demand a certain degree of expert knowledge, which, after consultation with the attendant physician, results in an intelligent occupation prescription.

Every process requires adaptation to the mentality of the patient, and must be administered with the therapeutic purpose definitely in mind. Movements of relaxation are helpful to excitable patients, while stimulating processes are required for those afflicted with languor, and processes involving concentration aid those who are depressed, while monotonous procedures tend to subdue those unduly exhilarated. Indifference must be overcome by processes of interest and variety, while continued application most aids those suffering from restlessness.

The length of time patient should be employed at one kind of work, his rate of progress, the change of work demand trained judgment. "The therapeutic value of an occupation is gone to some patients the moment the occupation is fully mastered, and recovery is measured by the systematic change from occupation to occupation, each demanding more initiative and concentration. On the other hand, the continued practice of an occupation long after its mastery gives to other patients just that poise and self-confidence essential to recovery."

Reeducation through ward occupation includes influence upon the will, thought function and feeling, though the greatest emphasis should lie on the reeducation of the will, upon which is dependent both initiative and application—transitional results of utmost service.

Physiological values of ward occupations apply to patients confined to their beds as well as to those convalescent and able to be about, though suffering from various anatomical defects and physiological handicaps. It must be borne in mind that no occupation is therapeutic in itself, but only becomes so as it is selected and taught in relation to particular disabilities. Where limitations of movement are involved, the benefits of the functional reeducation may be gauged by various schemes of measurement which have been devised for particular movements. It is patent that all instruction through occupation should call into play the particular muscles or joints needing exercise. The aim is not so much nicety of performance as physiological development. Functional reeducation must be begun early and the more permanent the disability is likely to become, the earlier is it required, despite the nature of the existent handicap.

Ward occupation must be taken out of the category of end performances and to be regarded as the first step in complete rehabilitation. All occupations, especially those given to patients seriously incapacitated, should be esteemed only insofar as they form steps in a process of progressive education leading to the ultimate control of functions to the limit of potentialities.

The idea of the work prescription is possibly new to many, although it has been utilized for many years in connection with the treatment of tuberculosis, blindness, and various deformities. Work for patients should be permissive, and not mandatory. It should play as large a part in the routine of hospital life as the treatment with drugs, water, electricity, or massage. The creation of a spontaneous interest and enthusiasm for work enables functional results to be attained more quickly and with greater success than is possible without the benefits of interest, education and functional restoration through individually adapted occupation. "Whether the patient is conscious of work being definitely prescribed to aid his condition or whether he is thinking of occupation as a privilege not interfering with his recovery, the determining of occupation must always be a matter of serious consultation between the doctor responsible for the patient and the ward occupational therapeutist. Whether the patient knows there is a prescription or not is a matter of psychology; but it is always necessary that there be a prescription, and the results of occupational treatment should be charted."

Book Reviews

Gynecology. By WILLIAM P. GRAVES, M.D., Professor of Gynecology at Harvard Medical School. *Second Edition,* Thoroughly Revised. Octavo volume of 883 pages with 490 original illustrations, 100 of them in colors. Philadelphia and London: W. B. SAUNDERS COMPANY, 1918. $7.75 net.

The second edition of this most excellent work differs from the first in that new material has been added in those sections devoted to the relationship of the ductless glands to gynecology; and in the addition of a new section describing the relationship of the sex impulse to gynecology which is based on the now generally accepted theories of Freud.

In every way this second edition upholds the excellence of the first: it is well written, beautifully and sufficiently illustrated, and handles the subject with a lucidity which should make this a valuable book for reference.

Lecons de Chirurgie de Guerre. (Lectures on War Surgery.) Published under the auspices of the Service de Sante and under the direction of CL. REGAUD, Professor in the Pasteur Institute and Director of the Centre of Teaching at Bouleuse. Octavo of 394 pages with 171 figures. Paris: MASSON ET CIE, 1918.

This volume consists of a series of lectures given during the course of a period of instruction given for the benefit of the French military surgeons, at a centre established by the Service de Sante of the French army. Some of the sections have already appeared in substance elsewhere. The contributors are the members of the teaching staff, Guillain, Jeanbrau, Lecene, Lemaitre, Leriche, Magitot, Mocqot, Nogier, Okincyz, Piollet, Policard, Roux-Berger, and Tissier.

Practically the entire field of military surgery is covered in this volume; wounds are discussed in general, in regard to their pathology and bacteriology; and are followed by excellent chapters devoted to the extremities, the thorax, abdomen, etc. A fine chapter is devoted to the important subject of transfusion; one notes that the citrate method is apparently gaining in favor and may ultimately dominate the field. Certainly under war conditions it is the ideal method.

Large sections are devoted to the primary and secondary suture of wounds; to the treatment of fractures, and joint wounds, to which orthopedic principles are applied; and to amputations.

The volume is a compilation of all the information which the present war has called forth.

Physiology and Biochemistry in Modern Medicine. By J. J. R. MACLEOD, M.B., Professor of Physiology in the University of Toronto, Toronto, Canada; formerly Professor of Physiology in the Western Reserve University, Cleveland, Ohio. Assisted by ROY G. PEARCE, B. A., M.D., Director of the Cardiorespiratory Laboratory of Lakeside Hospital, Cleveland, Ohio, and by others. 903 pages, with 233 illustrations, including 11 plates in colors. Published by C. V. MOSBY COMPANY, St. Louis, 1918.

The purpose of this volume is to emphasize the importance and value of physiology and biochemistry in the routine practice of medicine. It deals with the present day knowledge of these vital subjects and attempts to show how great is their bearing upon a proper understanding of disease. For the internist, in the general, certain branches would have a limited value, therefore no space is devoted to the physiology of the special senses, of reproduction, of nerve and muscle. Nor have the writers tried to include and discuss the many and various biochemical tests of body tissues and fluids.

The plan of the book is practical. Part 1 is devoted to the physiochemical bases of physiological processes The essential fundamental laws of physics and chemistry are clearly outlined and then important tests and processes are discussed, *i. e.,* H ion concentration, regulation of neutrality in acidosis, specificity of hygiene action, etc.

The circulating fluids are treated in part two, while part three considers the circulation of the blood. Here are many chapters of much value and interest for the cardiographist. The respiration, the digestion, the excretion of urine, metabolism, the endocrine organs, and the central nervous system—each receives a separate portion of the volume, so that in reality this book consists of nine quite distinct monographs, each one, though not exhaustively complete, yet containing an excellent resumé of the important physiological and biochemical laws which have to do with their respective subject.

The book is written to be of use and help to the doctor who practices surgery and medicine. It has, therefore, a distinctly practical value.

Vaccines and Sera—Their Clinical Value in Military and Civilian Practice. By A. GEOFFREY SHERA, B.A., M.D., B.C., Cantab. M.R.C.S., Eng.; L.R.C.P., London; Honorary Captain R.A.M.C.; Clinical Pathologist to the British Red Cross Hospital, Netby; late Clinical Pathologist, Central Military and V. A. D. Hospitals, Eastbourne; late Clinical Assistant (Medical), Evelina Hospital for Children, S. E.; late R.M.O., Fulham Infirmary, S. W. With an introduction by SIR CLIFFORD ALLBRETT, K.C.B., M.D., F.R.S., Regies Professor of Physic, University of Cambridge, 226 pages. Price $2.50. HENRY FROWDE AND HODDER AND STOUGHTON, London.

This little volume aims to outline and to briefly indicate the present means of specific therapy, particularly vaccines and serums. Under vaccines the author considers the specific vaccine for its specific "disease group." Dosage, indications, effects are all given. Under sera are mentioned anaphylaxis and serum illness, the "endotoxin" disease, and those due to filterable viruses. Lastly, there are two short subdivisions, one devoted to specific therapy of special women's and children's conditions, the other devoted to normal and auto serum therapy.

The book is brief and practical.

Compendium of Histo-Pathological Technic. EMMA H. ADLER, formerly Technician Pathological Laboratory, Presbyterian Hospital, New York. New York: PAUL B. HOEBER, 1918. Octavo of 82 pages. Price $1.25.

As a brief compilation of the technic utilized in the pathological laboratory of the Presbyterian Hospital of New York this little booklet offers itself to the student untrained in laboratory work. The modest author makes no pretense of original contribution, nor, indeed, of presenting anything save methods which have been tried and found satisfactory in the routine work of a large laboratory.

Dispensaries: Their Management and Development. A Book for Administrators, Public Health Workers, and All Interested in Better Medical Service for the People. MICHAEL M. DAVIS, JR., Ph.D., Director of the Boston Dispensary, and ANDREW R. WARNER, M.D., Superintendent of Lakeside Hospital, Cleveland. New York: THE MACMILLAN COMPANY, 1918. Octavo of 426 pages. Price $2.25.

The growth of dispensaries in the United States and their value is attested by the fact that fully four million persons annually receive medical attention at dispensaries. Singularly, no single volume has been written giving due consideration to the principles of dispensary organization. Davis and Warner have offered a most valuable book discussing these fundamental principles with an elaborate discussion of the technic of dispensary building, organization, management, records, follow-up systems, efficiency tests, and that most important subject, finance. Special types of dispensaries, particularly, the public health dispensary and the health center, the specialty center and the pay-clinic, receive most thoughtful discussion.

The fifth section, devoted to the public problems centering around dispensaries, is particularly valuable in the light of the possibility of medical reconstruction due to war experiences. The relations of the dispensary to the medical profession on the one hand, and to the large public clientele on the other are carefully considered, particularly in connection with the organization of dispensary service for communities. A splendid bibliograph, suggestions for by-laws and rules for a dispensary, and a statement of the Massachusetts Dispensary complete the content of the book.

No other book states so clearly the dispensary problem or is filled with so numerous suggestions of a constructive character as the one reviewed. It should be read and given its merited attention by physicians, laymen, public health officials, and philanthropists who see in the dispensary a social institution for the improvement of civic health.

Information for the Tuberculous. F. W. WITTICH, A.M., M.D., Instructor in Medicine and Physician in Charge Tuberculosis Dispensary, University of Minnesota Medical School; Visiting Physician, University Hospital, Minneapolis, Minnesota. St. Louis: C. V. MOSBY COMPANY, 1918. Octavo of 144 pages. Price $1.00.

The care of the tuberculous is largely a matter of personal hygiene and personal practice. This is recognized by the author, himself at one time a sufferer from tuberculosis, who in a simple, practical manner has created a handbook for the use of the afflicted, giving adequate information to demonstrate how best to use time and energy in the fight against tuberculosis. The characteristics of the book are a delightful optimism, a practical cheerfulness, and a common sense point of view which needs but be imitated by the tuberculosis sufferer in order to have a better chance of a successful conquest of his disease.

The Orthopedic Treatment of Gunshot Injuries. LEO MAYER, M.D., Instructor in Orthopedic Surgery, New York Postgraduate Medical School and Hospital, with an introduction by COL. E. G. BRACKETT, M.C.N.A., Director of Military Orthopedic Surgery. 12mo of 250 pages, with 184 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY. 1918. Cloth, $2.50 net.

War has demonstrated many serious problems connected with the treatment of gunshot injuries. Fortunately Dr. Mayer has not felt called upon to write a complete book on orthopedic surgery, but has realized the necessity of emphasizing some of the fundamental principles and rules so essential in the treatment of war injuries. He has properly stressed the prevention and cure of deformities due to gunshot injuries. Obviously, sprains and dislocations play no part in the subject matter which deals mainly with fractures and injuries to joints, bones, and injuries to nerves, muscles, tendons.

The subject matter is divided into two parts. The treatment given at the front which has for its end the stopping of bleeding, and the proper fixation of the injured part. The second section deals with surgery at the Base Hospital where the aim is to discontinue fixation and restore motion and complete function.

The practical experience of the author, and the clearness of his presentation make it an unusually useful volume, not merely for the military surgeon, but for those whose field of surgery lies in the industrial world where severe injuries of bones and joints are not infrequent. Especially valuable for civil surgery are the chapters relating to treatment of the amputated, and the discussion of the aims and organization of the Orthopedic Reconstruction Hospital. The discussion of artificial limbs is most timely, and indicates the importance of this subject in surgical care. The inherent excellence of the book is generally spread throughout the subject matter and every chapter is full of suggestions, rational and practical, which merit careful study and application in the development of the orthopedic work of this country.

Progress in Surgery

A Résumé of Recent Literature.

Displacement of the Appendix. G. F. STRAUB and G. C. MILNOR. *Journal American Medical Association,* January 11, 1919.

Reports an interesting observation of an extreme displacement of the appendix, which was discovered with some difficulty in the operation. "The cecum was found to be drawn upward about 3 inches out of position, while the transverse colon formed a rather long loop hanging down below the umbilicus, without omentum. It was this loop constantly appearing in the wound that led us astray in exactly locating the appendix. The base of the appendix was finally found 3½ inches above McBurney's point, not postcecal, but anterior and adherent to some organ above, pulling the cecum upward and dragging the ileocecal junction with it." A second incision had to be made after the first McBurney incision to free the tip of the appendix and bring it down and allow the cecum to recover its normal position. The appendix was 6 inches long, normal in thickness, and aside from two strictures and a moderate degree of chronic congestion, was apparently normal. The authors explain the condition by an arrest in fetal development, probably around the eighth week of embryonic life.

Pericholecystitis. J. W. CHURCHMAN, *Journal American Medical Association,* January 4, 1919.

Churchman calls attention to the gastric symptoms that may be due to inflammatory conditions about the gallbladder and the consequent adhesions. He gives the points in regard in several cases observed. The adhesions are not the light veil-like structures often met with, but thick, firm, extensive adhesions of the gallbladder to the stomach, the liver, the colon or to the abdominal wall. The symptoms may be apparently indicative of gastric ulcer, and the importance of these cases is impressed on us that in patients in whom clinical examination does not reveal gastric ulcer or gallstones, pain in the upper quadrant of the abdomen or stomach region may be solely due to such adhesions. If the clinical picture represents the late results of a previous cholelithiasis, it is another argument for the operation of cholecystectomy when gallstones are found in the bladder, and Churchman believes it is the operation which should be done. There is no excuse for injury to the common duct if the cystic duct is fairly freed before it is clamped. While the author does not think that such symptoms insure the diagnosis of adhesions, they call for an exploratory operation as a routine measure.

Meckel's Diverticulum—Report of Cases Causing Intestinal Obstruction. R. GRAHAM, *The Canadian Medical Association Journal,* November, 1918.

Graham reports four cases, with two recoveries; he concludes:

1. In post-operative cases showing distension late in their convalescence, one should bear in mind the possibility of a Meckel's diverticulum being a causative factor, considering the fact that they occur in two per cent. of autopsies.

2. The palpation of tense coils of intestine as pointed out by Starr is an aid in localizing the obstruction.

3. The history of no previous illness and the history of no umbilical discharge is no criterion that the patient has no diverticulum remaining.

4. If a patient after operation has had an uneventful convalescence for three days, and then develops abdominal distension, acute ileus is scarcely to be considered and some other cause must then be looked for.

5. Intestinal obstruction caused by Meckel's diverticulum seems to come on more gradually and is more intermittent than most acute obstructions.

Spastic Ileus. LEONARD FREEMAN, *Annals of Surgery*, August, 1918.

Spastic ileus is a localized contraction of an intestinal coil, the mechanism of which is not clearly understood, but which is probably of some reflex neurogenous character. It is not always possible to exclude a mechanical condition and operation is done often under a mistaken diagnosis. When the condition is once recognized antispasmodic remedies are indicated.

Rupture of the Uterus. ROBERT Y. SULLIVAN, *American Journal of Obstetrics, Etc.*, October, 1918.

There are four observations which when existing at the same time, according to Sullivan, suggest impending rupture. 1. Strong pains without appreciable advancement. 2. Exquisite tenderness on palpation to the degree of actual hysteria. 3. Undue bulging in the lower uterine fold during pain with subsequent relaxation. 4. The sensation of tearing muscle fiber when the abdomen is palpated during labor. To this may be added tonic cordlike tension of the round ligaments, especially the one on whose side rupture is threatened. The great restlessness, hysteria, disturbed mental state of the patient is characteristic. She rolls about in frantic agony. For the greater frequency of uterine rupture during labor two factors are principally responsible. 1. The greater resort to abdominal Cæsarian for a variety of relative indications and 2. The indiscriminate use of pituitrin. On the other hand, adequate study of all obstetric cases before labor, especially *internal pelvimetry*, will reduce the frequency of uterine rupture by instituting appropriate operative treatment in cases complicated by tumors, overdistended uteri, oversized child and diseased uteri.

The Positive Wassermann Reaction Which Changes to a Negative at the Termination of Pregnancy. MAUD L. MENTEN, *Amer. Journ. of Obst. & Dis. of Children, Etc.*, October, 1918.

Menten found that in over half the cases tested for Wassermann reaction before and after labor the positive Wassermann changed to a negative reaction. In a series of 357 patients 13.45 per cent. give the positive Wassermann reaction several days to weeks antepartum. In 26 of these positive cases the blood was tested several days to two weeks postpartum. Of these 14 were negative and 12 positive. It is not settled whether the positive reactions invariably indicated a syphilitic infection or whether possibly the blood of a pregnant woman contains those elements which simulate the Wasserman reaction. Of the 12 positive cases the histories would corroborate the diagnosis of lues in at least three cases.

The Funnel Pelvis. With a Report of One Hundred and Six Cases. HERVEY WILLIAMSON, *Amer. Journ. Obstetrics, Etc.*, October, 1918.

Williamson lays stress on the importance of estimating the transverse diameter of the outlet in taking pelvic measurements during pregnancy. A transverse diameter of 5.5 cm. or below is an absolute indication for Cæsarian section. Normally this diameter is 11 cm. Williamson considers a pelvis of the funnel type when the transverse diameter of the outlet measures 8 cm. or less. As a result of his study of 106 cases of funnel pelvis, Williamson concludes that abdominal Cœsarian section should be performed at or just before term in cases of extreme outlet contraction. In moderately contracted pelves the indication of premature labor offers a safe method of preventing a difficult delivery with deep perineal tears. Pubiotomy is advisable in certain cases where forceps have failed. A transverse diameter of 7.5 cm. with a 7.5 cm. posterior saggital, is consistent with spontaneous labor. The funnel pelvis is the usual cause of deep perineal tears.

Relation of Syphilis to Abortion. FRED. L. ADAIR, *American Journal of Obstetrics, Etc.*, November, 1918.

Syphilis according to Adair is not the potent factor in producing the termination of pregnancy during the first trimester, as in thirteen of his syphilitic cases there were 74 pregnancies with but 23 abortions or 1 in 3. The same proportion obtained in his unsyphilitic cases. On the other hand, about 20 per cent. of the premature infants gave positive evidence of luetic infection. Of the mothers who had stillbirths, 10 per cent. gave positive Wassermann reactions. Of the stillbirths in the hospital 12 per cent. were proved syphilitic. Two of the malformed infants were born to syphilitic mothers, which is a higher ratio for those having syphilis than for those who did not. Syphilis was also proved in two out of five cases of hemorrhage of the new-born.

The Heart of a Pregnant Woman. L. BURCKHARDT, *American Journal of Obstetrics, etc.*, December, 1918.

An early diagnosis of a heart lesion is essential for successful therapeutics. The history of the case is important: Menstrual disturbances, aversion to exertion, vasomotor disturbances, a multipara who has never regained her full strength after a previous delivery, pyeletes, other forms of sepsis, and toxemias should be looked upon as suspicion. To depend on marked objective changes in the heart and the general system means the loss of valuable time. Low pressure, the absence of accentuation of the pulmonic or aostic second sound, the displacements of the cardiac outlines, and the change in intensity of murmurs over the ostia, are of greatest importance. The frequent simultaneous occurrence of a toxemia and a cardiac disturbance, caused perhaps by the same factor are important: relatively low pressure, with a steadily increasing amount of albumin, of blood nitrogen, granular casts and blood cells presages early collapse. Drastic measures, if unavoidable, include prolonged and absolute rest in bed, the use of opiates, and larger doses of digitalis, all of which interfere with the essential metabolism. Impregnation should be prevented if possible; if conception has occurred, it should in all but the severest treatment be carried to term. Rest and exercise, neither half-heartedly, should be prescribed. Blood pressure readings especially between the thirty-fourth and thirty-fifth week when daily observations are necessary in order to determine the proper time of interference and when patients should be confined to bed, assist greatly in controlling the patient's work. Settling usually gives a considerable amelioration of symptoms and patient may be given more liberty. Offending tonsils or teeth should be removed; any nasopharyngeal or dental work should be attended to. And last but not least, digitalis to regulate the work and rest of the heart.

Ureterovesical Anastamosis. ANDERS PETERSON, *Journal American Medical Association*, December 7, 1918.

Peterson reports experiments and clinical observations on the effect on the kidney of ureterovesical anastomosis. A brief historical sketch of the operation is first given, and the different types of technic, those of Coffey, Stiles, Furniss and Mann being described. The object of the experiments and observations was to evolve a technic for the reimplantation of the ureter into the bladder, and to study the effects on the kidney and ureter. Twenty-four experiments were made on dogs, the majority being unilateral implantations, and the technics and results are described. In view of the end result, Peterson says, and the simplicity of the operation, the modification of Stiles' technic used seems most suitable in ureterovesical anastomosis. The original technic consists in entering the lumen of the bowel through a stab wound and approximating the intestinal wall without further dissection over the ureter. The modification consisted in splitting the anterior aspect of the wall of the ureter for about one-fourth inch; no suture except the anchoring suture was permitted to enter the wall of the ureter. Care was taken to avoid any injury to the proximal end of the severed ureter, and no forceps were placed over the end. Forceps were placed on the side of the bladder, and the ureter cut with a thin scalpel about 1 cm. above this clamp. While the sutures infolding the ureter in the wall of the bladder were being tied, a thyroid needle was used as a seeker in order to avoid any undue compression on the anastomosis. There were six complete successes in the eight operations. The

experiments are reported in detail and summarized in tables. A clinical report of twenty-one cases in the Mayo Clinic is also made and discussed, and the following are the author's conclusions: "1. From experimental and clinical observations, it is obvious that a normal or almost normal kidney and ureter should result following the implantation of the ureter into the bladder. 2. The utmost care to minimize the operative trauma must be observed. 3. The placing of forceps over the end of the ureter should be avoided. 4. No suture should enter the wall or lumen of the ureter other than the anchoring suture placed in the split extremity of the ureter; and the approximation of the wall of the bladder must be accomplished without undue compression. 5. When marked dilatation of the ureter has occurred prior to surgical interference, and when it is necessary to implant the ureter under tension, a successful result is very doubtful, and ligation is preferable to any effort of implantation."

Recurrence of Stone in the Kidney. CHARLES R. ROBINS, *Surgery, Gynecology and Obstetrics*, September, 1918

Robins quotes the conclusions of Cabot and Crabtree: "On the basis of these cases, we can only say to the patient that the risk of operation is small; that the danger of progressive destruction of the kidney by the stone, if it is left, is considerable; that it depends somewhat upon the age, undoubtedly somewhat upon the method of operation and the skill with which it is carried out, but clearly upon an entirely unknown factor—the liability or the ability of that particular kidney to form concretions."

Malar Bone Fracture. A. E. ROCKEY, *Journal American Medical Association*, January 4, 1919.

This describes a method of diagnosis of fracture of the malar bone, which may vary in the extent of the depression, location of fracture line and complicating fractures elsewhere according to the force and direction of the trauma. The occasional occurrence of total or partial anesthesia in the area of the intraorbital nerve shows clearly that the fracture line runs through the foramen of exit. The orbital plate is also involved and perhaps the temporal process, and when the depression is slight, the deformity may not appear until the swelling goes down. He has devised a method to detect even a slight depression, as follows: "Two straight wooden applicators are placed, vertically at the outer edge of the orbit from the prominence of the cheek bone upward. . . . If depression exists, the difference in angle is obvious. The swelling may be pushed out with the finger tip and the end of the applicator given a firm rest on the bone. The bone may usually be easily raised into position by grasping it through the skin with heavy tenaculum forceps. The ordinary towel clips at hand in every surgery answer the purpose admirably. A general anesthetic must be given. Gas does well, as the operation is short." The operator must satisfy himself both by palpation and repetition of the test that the normal position has been obtained. As a rule, the bone stays well in place, but care should be taken to protect the cheek from external pressure until healing is complete.

Concerning the Symptoms Attributed to Lesions of the Sacro-Iliac Joint. ROBERT B. COFIELD, *American Journal of Orthopedic Surgery*, November, 1918.

The symptoms occurring in acute and chronic sacro-iliac lesions, as well as many of the sciaticas, are to be explained by sprains of the joint, the spasmodic action of the posterior musculature of the body and the sequelæ resulting therefrom. Hitherto manipulation has been practised in an empirical way. When performed with a definite idea of restoring the retracted muscles to a normal tension and the breaking down of periarticular adhesions, the efforts are guided by more intelligence and foresight. On account of the frequent occurrence of anomalies of the spine and pelvis in this region, an x-ray examination can only be of positive value when checked up by a subsequent examination after a cure is effected.

The Results of Primary Excesion for Wounds of the Elbow-Joint. A. EISDELL MOORE, *British Journal of Surgery*, October, 1918.

Extensive primary resection always results in a flail joint. Limited excision gives satisfactory results. If the bone is comminuted muscle-fascia flaps should be carried in to cover the bone surface as is done in an arthroplasty. Post-operative support of the forearm is essential. Rest is more important than early movement. In certain cases of flail joint capsulorrhaphy does good.

Clinical Observations Concerning Malignant Tumors of the Jaw. ALBERT J. OCHSNER, *Annals of Surgery*, August, 1918.

Malignant growths seem slower in making metastases in the jaws than in many other parts of the body. Tumors in the lower jaw are followed more frequently by metastases. Recurrence is less likely to follow a cautery removal, than a knife removal of the growth. The mortality of primary operations is almost nothing and the results are good; in late, or secondary, operations the opposite is true.

In sarcoma it is best to excise the entire jaw on the side of its occurrence. In carcinoma deep destruction with cautery seems to bring better results.

Recurrent Dislocation of the Lower Jaw. JOHN BAPST BLAKE, *Annals of Surgery*, August, 1918.

A new operation is suggested. The coronoid process, or the insertion of the temporal muscle into it, should be tied up to the anterior part of the zygomatic arch. This may be done with silver wire, or with slowly absorbable suture material. The operation, though not so easy of execution as of description, is less difficult than the attack on the temporo-maxillary joint, is much more logical, and more mechanically efficient; it does not injure important structures, and the scar is not disfiguring. The result should be 100 per cent. success.

An Observation of the Carrel-Dakin Method of Treating Chronic Wounds in an Orthopedic Centre in England. JOHN DUNLOP, *American Journal of Orthopedic Surgery*, December, 1918.

Old infected wounds can be cleaned up and healing can be quickened by this method. Complete sterilization is difficult and was never accomplished so that secondary suture could be done. It is difficult to prevent sinus formation in the through-and-through wounds, especially when sections of bone are absent.

Drainage of Chest Wounds. M. A. BLANKENHORN, *Journal American Medical Association*, December 14, 1918.

Blankenhorn remarks on the difficulties caused by open pneumothorax in drainage of chest wounds, especially in those inflicted in war. Patients operated on early and left with open drainage have always done badly, and those not operated on have developed empyema or become septic. Patients operated on at a selected time and closed again have done well, but it is not always possible to provide operation and closure at the critical hour, and many cases are seen, especially at the base which demand drainage. In such a case the pleural membrane, respiration and circulation are relatively normal, but when an open pneumothorax is produced, it exposes to infection, and impaired respiration and circulation render the situation more serious. It is certain that the pleural membranes when approximated resist infection better than when separated. Mechanical difficulties have been the greatest obstacles in the way of closed drainage. The trouble is usually in making an anastomosis between a rubber tube and the chest wall. At the Lakeside Unit they have used the Brewer tube with very satisfactory results. It is a rubber tube with flange arrangements to be inserted through a rib that has been resected from ½ to ¾ of an inch. "It is not necessary to suture the tissues tightly

around the tube, for an air tight junction can be made with adhesive tape and dressings together with the flanges of the tube. To maintain a continuous negative pressure on the chest, a stiff rubber bulb is collapsed and connected to the free end of the tube by a glass connection. In civil practice we were using Politzer bags, but at present the rubber bulbs of automobile horns are more available. At operation the surgeon can usually insert the tube through his stab wound with very little inrush of air and by manipulating the flanges of the tube prevent a pneumothorax of any appreciable size from forming. What air has entered the chest can be promptly pumped out with the bulb, a large surgical clamp on the tube being used as a valve. By keeping the bulb collapsed and dependent below the wound . . . one can make the lung expand normally and at the same time provide a liberal drainage of the pleural sinus." The lung was found to come down very readily and breath sounds were audible almost at once over the space once occupied by fluid. In all cases the tube remains tightly in place for five days at least, and the lung adherent to the chest wall thus preventing pneumothorax. After the second or third day irrigations at low pressure can be made through the tube, being careful not to tear the lung from its new adhesions, and coughing should be prevented for the first five days. When the chest has been explored for a foreign body and drainage is found necessary it is best to make it through a separate opening, especially if there is contamination of the surgical wound by the wound of entry. In chronic empyemas after gunshot wound, or when there has been considerable fibrosis of the visceral pleura, a system of closed drainage with suction will expand the lung better than blowing exercises, but the methods can be combined. In chronic cases where granulations have formed around the wound, the tube can be removed, cleaned and replaced, and an air tight junction made again with the help of adhesive tape.

Postoperative Thoracic Drainage. WILLY MEYER, *Annals of Surgery*, August, 1918.

Kenyon's method is useful for post-operative thoracic drainage. It is simple, safe, and easy of execution. It permits of satisfactory observation of the quality and quantity of the effused fluid. This method fulfills Sauerbruch's demand that the chest be water- and air-tight after operations.

Diseases of the Costal Cartilages. ALEXIS V. MOSCHCOWITZ, *Annals of Surgery*, August, 1918.

Cartilage exposed in an infected wound does not heal, and practically always forms a sinus. A cure of such a condition is only obtained by removing the entire extent of the cartilage, so that no cartilaginous tissue is exposed in the wound. Suture is then made with none or filiform drainage.

Tetanus. M. D. ROJAS, *Journal American Medical Association*, December 28, 1918.

The report of a case of tetanus treated by injections of tetanus antitoxin and potassium bromid and chloroform inhalations without improvement, for five days, followed by success with the Baccelli treatment of 3 per cent. phenol injections near the spinal roots every two or three hours, rectal feeding and morphin. Later potassium bromid and chloral hydrate were substituted for the morphin, after the muscular rigidity had disappeared. Still later, tonic treatment was given. The total time that elapsed from beginning of treatment, May 24, till discharge, apparently in good condition, July 19, was fifty-six days. During the last ten days, the treatment was mainly tonics, and free diuresis, with attention to the bowels. From the case, Rojas deduces that antitetanic serum, of which 68,000 units were used altogether, is of doubtful value after the toxin has been fixed in the cells. Baccelli's phenol treatment undoubtedly neutralizes some of the toxin, and possibly inhibits, somewhat, the growth of the bacillus. Diuresis stimulated by fluid injections and the use of hexamethylenamin is useful in diminishing the toxin products and eliminating them.

Delayed Tetanus. W. L. WHITTEMORE, Kent, England. *Journal American Medical Association*, December 14, 1918.

Whittemore reports two cases of tetanus, in which after apparent recovery there occurred, at a later date, similar though milder attacks of the same disease. These men were wounded one three and one-half months before the onset, and the other nine months previous. In the second case, three months after the original wound was received, an operation was performed in the neighborhood of the healed wound which may have caused an earlier appearance of the disease. In both local symptoms and signs appeared two and three weeks before the secondary generalized disease. Both patients were treated with antitetanus inoculations, both shortly after the original wound, and during the attack. Eye symptoms were present in both cases, and in one a bad keratitis in the other iritis and conjunctivitis. Whittemore concludes from these cases that the incidence of traumatic tetanus may be markedly delayed and that relapses may occur after such attacks. The premonitary symptoms are localized in the neighborhood of the wound. The relapses are not so long or severe as the original delayed attack, which may be followed by muscular symptoms for weeks and months, and these cases raise the question whether excision of the focus may not be advisable, even when there is no foreign body included, as a precautionary measure against tetanus.

Treatment of 420 Infected Wounds Under Battle Conditions Arriving on an Average of 58 1/3 Hours After Injury Without Previous Surgical Treatment. LT. COL. G. W. CRILE. *Canadian Medical Association Journal*, November, 1918.

Crile describes the method of preparation of the patient and all the immediate measures necessary, viz.: removal of devitalized tissues, anticipatory incisions to prevent phlegmons, etc. To combat infection, five methods were employed: 1. Surgery, plus dry gauze—no antiseptics. 2. Flavine. 3. Dichloramin T chlorocosane. 4. Loright's hypertonic pack. 5. Alcohol.

Of the 420 cases 67 were marked for delayed primary suture; 44 superficial wounds were immediately sutured. Of the 44 immediate sutures, all were successful; of the 67 delayed sutures, 91 per cent. healed primarily. Of the total number 93 were compound fractures. There were four deaths, and there was no case of bacteremia or septicemia. There did not seem to be any appreciable difference whether an antiseptic was or was not used: the results with each were practically uniform.

Injuries of the Peripheral Nerves from the Surgical Standpoint. H. S. SOUTAR and E. W. TWINING, *British Journal of Surgery*, October, 1918.

In operating for injuries of the peripheral nerves, it is essential that an accurate idea of the anatomy of the region be had; of the condition of the nerve which is to be repaired; and of the method by which repair is to be accomplished and the latter should be the simplest possible. Excision of the scar is necessary into healthy fibers, and end-to-end suture is best. The physical treatment should be based on a definite routine, modified in accordance with the special requirements of the case. For this a good organization is necessary.

Treatment of "Essential" Facial Neuralgia by Local Alcoholization. J. A. SICARD, *Boston Medical and Surgical Journal*. Sept. 19, 1918.

A long and rich experience with this method convinces Sicard that surgery has no longer any *raison d'eare* in the treatment of "Essential" facial neuralgia. Sicard has tried many substances but finds that alcohol in strengths of 70 to 95% is the best. Sicard describes carefully the anatomy of the fifth nerve and the technic of injecting the various faramina of exit of the various branches. The article also is full of details concerning the post-operative course and accidents that are liable to occur. His results have been truly remarkable. The injections as a rule require repetition at the end of a year or 18 months, sometimes to the extent of a half-dozen. Often a single injection brings about a perfect cure and it is rare that more than six injections are necessary.